Big Gas Turbines in Third Year

PFE Tests Reefer Insulation

RAILWAY

LOCOMOTIVES AND CARS

APRIL 1961

FOUNDED 1832
AMERICA'S OLDEST TRADE PAPER

ACL Assembly-Line Engine Overhaul... page 17

THE ONE AND ONLY

DRAFT GEAR

utilizing rubber... plus friction... to receive

FULL A.A.R. UNCONDITIONAL APPROVAL

The Miner Class RF-333 Draft Gear Provides Greatest Absorption with low recoil, insuring safer handling of lading.

In use over eight years on all types of freight cars and locomotives. A masterpiece of shock protection for every service.

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OFFICE OF FOREIGN OPERATIONS: 1212 Pennsylvania Bldg. • 425 Thirteenth St., N. W. • Washington 4, D. C. • U. S. A.

Freight Liner

PLASTA-GARD

Thirty to 50¢—you save this much on every journal with ADM's new PLASTA-GARD Strippable Plastic Coating. You save this much by eliminating the costly, messy, time-consuming operations of conventional journal cleaning. No scrubbing and wiping with solvent-soaked rags . . . no fire pots in winter to scorch journal surfaces!

Even after long exposure to sub-zero cold or sizzling sunlight, this super-tough plastic peels off slick and clean in seconds. PLASTA-GARD stays flexible and strippable *permanently* — assures positive all-weather protection against rust and corrosion.

PLASTA-GARD also is ideal protection for drive shafts, diesel valves and other machined-metal surfaces. Since it dries by evaporation (no catalyst is required), PLASTA-GARD can be applied at any temperature. Formulations for brush, spray, and dip-coat application are available. One gallon of PLASTA-GARD provides two-coat protection for about 60 journals . . . positive protection in any climate.

Investigate the important economy and convenience of PLASTA-GARD strip-coating today. Write, wire or call ADM for full information and a product sample.

Archer-Daniels-Midland

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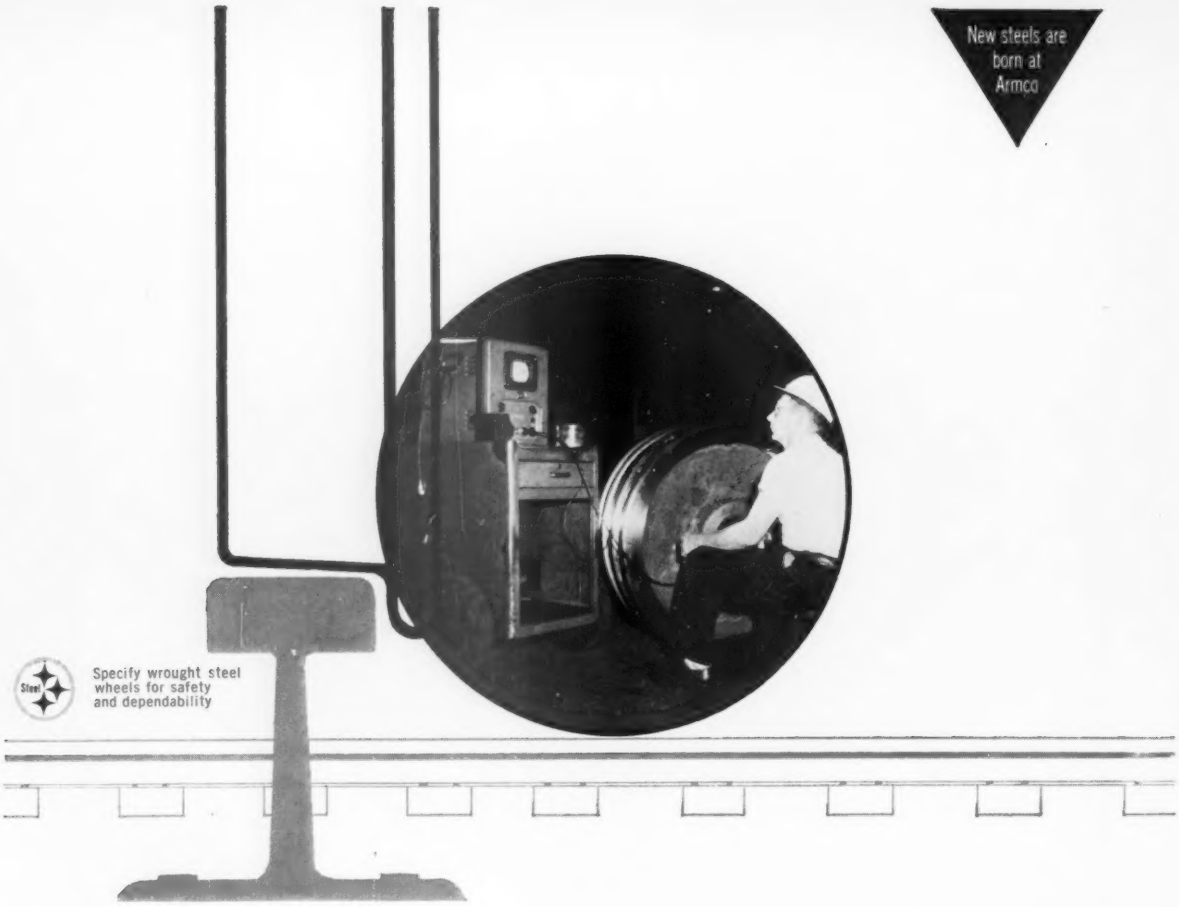

More-durable wheels THROUGH ARMCO RESEARCH

For many years, wheel service conditions have been thoroughly investigated by Armco research engineers. You reap the benefits. Research findings help Armco set up manufacturing techniques that will consistently produce the most durable wheels for specific conditions.

Moreover, Armco wheel research yields information that helps you get safe, satisfactory service from wheels you buy. "How to Get the Most from Your Armco Wrought Steel Wheels," a section of Armco's new wheel catalog, is a good example. Send for a copy of the catalog. For prompt price and delivery information on Armco Wrought Steel Wheels, call your nearest Armco Sales Office. Armco Division, Armco Steel Corporation, 1571 Curtis St., Middletown, Ohio.

ARMCO Armco Division

RAILWAY
LOCO-MOTIVES AND CARS

America's Oldest Trade Paper
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REPORT FOR APRIL

LMOA Program Stresses Savings in Maintenance

The Locomotive Maintenance Officers' Association is stressing how to do a better locomotive maintenance job at less cost in all its 1961 work. At a meeting of its executive committee members and technical committee chairman on March 7, LMOA President O. L. Hope, assistant chief mechanical officer, Missouri Pacific, emphasized that all reports to be presented this year must be specific in showing how economies in maintenance work can be achieved.

A unique system is to be used by the LMOA to improve the quality of all reports to be presented at its September annual meeting. It has a pre-convention program by which it presents all reports prior to the September meeting through the cooperation of local diesel clubs. Each of its eight 1961 reports will be the feature at a regular monthly meeting of a different diesel club. The local clubs get the advantage of a high-quality report prepared by outstanding maintenance officers; the LMOA gets help, through discussions from the floor, in making a good report even better.

The Fuel and Lube Oil report was presented by C. A. Wilson, general supervisor diesel engines, AT&SF, before the Chicago Railroad Diesel Club on March 7. Other reports will be presented by LMOA technical committee chairmen as follows:

April 4. Great Lakes Railway Diesel Club (Cleveland)—New Developments in Motive Power, C. P. Turner, system supervisor, diesel operation and maintenance, LV.

April 11. Southeastern Railway Diesel Club (Richmond)—New Simplified Controls for Steam Generators and Steam Generator Turbo-Tube Performance, J. J. Dwyer, chief chemist, C&O.

April 12. Louisville Diesel Club—Shop Equipment (spot systems), S. C. Snow, superintendent motive power, L&N.

O. L. Hope
President, LMOA

April 20. Southwestern Railway Diesel Club (Houston)—New Economical Methods that Improve Service Life of Diesel Engines, K. Pruchnicki, supervisor locomotive maintenance, T&NO.

April 24. Mile High Diesel Club (Denver, Colo.)—New Ideas in Maintenance and Rebuilding of Traction Motors and Main Generators and Upgrading Control Equipment, C. J. Frey, electrical department foreman, Rock Island.

May 1. St. Louis Railroad Diesel Club—Effect of New Type Brake Shoes on Locomotive Maintenance and Operation, E. Milkert, assistant to superintendent motive power, Alton & Southern.

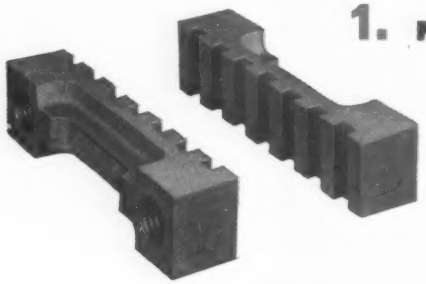
May 17. Mid South Air Brake & Diesel Club (Memphis, Tenn.)—Diesel Material Reconditioning and Control, K. L. Pollitte, manager system assembly shops, Southern.

TIME SAVING IDEAS FOR APRIL

DEPARTMENTS

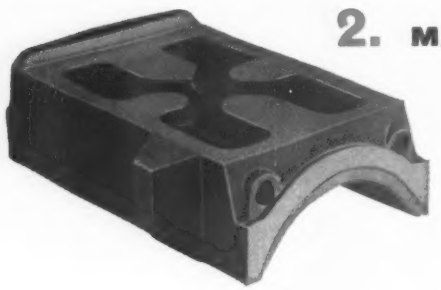
STABILIZED

Now MAGNUS offers you three low-cost ways to



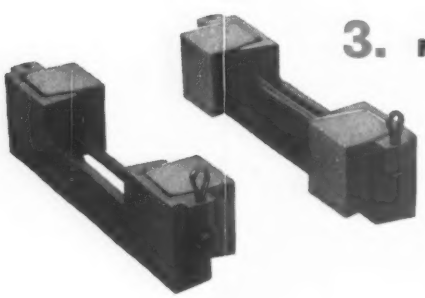
1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of the entire journal box assembly—increase miles per hot box ten times



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

get BETTER BEARING PERFORMANCE

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

Journal Stops give the low-cost solid bearing a chance to work at optimum efficiency, not just part of the time, but *all* of the time! They can be easily installed on any freight car, new or old. And they increase new car costs less than 2%—*pay for themselves* in less than 3 years!

Wear on R-S Journal Stops is slight, and Stops can be re-shimmed should wear become excessive. The Stops should last the life of the side frame.

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

MAGNUS METAL CORPORATION
Subsidiary of **NATIONAL LEAD COMPANY**

GEARED TO PROGRESS
P R I MEMBER

AIEE Land Transportation Committee RR Conference

The Land Transportation Committee of the AIEE, in conjunction with the AIEE Cleveland Section, is scheduling a two-day "Automation and Computer" Railroad Conference in Cleveland, June 6 and 7.

This Cleveland meeting is a substitute for the cancelled April meeting which was to have been sponsored by the Railroad Division of the ASME and the LTC at San Francisco.

Equipment Orders Still Lagging

The *Boston & Maine* has ordered six 1,800-hp GP18 road switchers from EMD for May delivery. Cost $1,036,000.

The *Delaware & Hudson* has purchased six 1,800-hp diesel-electrics from Alco to replace 1,500-hp units that are being retired.

One of the new 16-cylinder, 2,400-bhp diesel-electric locomotives, designed and built by Alco (RL&C, Feb. 1960, p 17), is now in service on the *Green Bay & Western* moving priority freight between Kewaunee, Wis., and Winona, Minn. The locomotive is geared for 65 mph.

The directors of the *Louisville & Nashville* have authorized the expenditure of $454,000 for the purchase of additional equipment for shipment of automobiles. L&N will acquire 50 tri-level and 10 bi-level racks for installation on (TTX) piggyback flat cars.

The acquisition of 100 new commuter cars, at an estimated cost of $20,000,000, is planned by the *New Haven*. Stockholders are being asked to approve purchase of 50 cars through the sale of equipment trust certificates or other financing, and lease of 50 cars from Port of New York Authority under New York State's commuter-aid program.

The Port of New York Authority is receiving bids for "some 50" new commuter cars for use by the *New York Central*. The electric-powered, air-conditioned coaches, to be leased to the NYC, are expected to be in service early in 1962.

The *Pennsylvania* will rehabilitate 2,019 cars and repair 6,440 others during 1961 at an estimated cost of $7,500,000. All work will be done at Hollidaysburg, Pa., shop. The rehabilitation program ($5,000,000) includes 1,000 hopper cars, 595 box cars, 100 covered-hopper cars, 60 gondolas carrying containers, 54 double-deck livestock cars, and 210 cabooses. The repair program ($2,500,000) will include mostly hopper and box cars, with some gondolas and flats. Earlier plans called for building 3,529 new cars at a cost of $29,000,000 (RL&C, Dec. 1960, p 8).

High Wheel Loads Increase Rail Damage

Multiple-unit freight cars equal in capacity to the 90- and 100-ton freight cars which have recently been introduced might produce significant reductions in track maintenance costs, according to G. M. Magee, director of engineering research, AAR. Writing in *Railway Age*, Mr. Magee estimates that maintenance-of-way costs for one 100-ton carload would average $41.10 as compared to $27.90 for a similar "carload" moved in a multiple-unit combination of two 50-ton cars.

Avergae wheel loads of freight cars have been increasing for years. From 1921 to 1959, average capacity increased from 42.5 tons to 55 tons, or 30%. Railway maintenance engineers have been aware for several years of the effect that the increasing wheel loads are having upon the rail, Mr. Magee reports. The larger rail in main track today is generally quite capable of supporting the increasing wheel loads, insofar as flexural stresses are concerned.

Critical stresses in rail today are those associated with the contact pressures of the wheel on the rail. In the longitudinal vertical plane, the rail surface is straight and the wheel has a diameter of 33 in. In the transverse vertical plane, the rail wears to a radius of 10 in. and the wheel tread hollows to a radius of about 17 in. Actual contact area of the wheel on top of the rail is an ellipse about ¾ in. wide and ⅝ in. long. This small area must withstand the entire wheel load, and its size is not affected by increased rail size.

The contact surfaces are subjected to high compressive stress from the wheel load, resulting in variable internal compression, tension, and shearing stresses within the head—stresses conducive to the development of progressive or fatigue failures. Almost 80% of the 12,353 rail failures occurring in the past ten years' rollings of control-cooled rail were the result of the contact pressure of the wheel on the rail.

While increasing the strength of rail steel would help, present rail steel is already as strong as can be obtained without heat treatment. Cost of heat treatment—approximately $65 per ton—when added to the cost of $115 per ton for rail, makes this uneconomical, except for sharp curves carrying heavy traffic, according to Mr. Magee. With railroads annually replacing only about 5,000 track-miles with new rail, it would take 50 years to get all main-line track relaid with heat-treated rail. While Mr. Magee knows of no change which could be made in the contour of the rail head to alleviate high contact pressures, it would require the same interval to place such rail in service if it were to be developed.

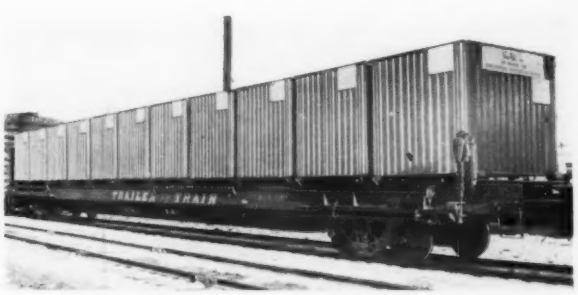
The wheel situation is different. With heavier cars, it is practical to utilize heat-treated wheels that are capable of withstanding the contact pressures developed. However, some wheel loads now being considered are even beyond what the manufacturers consider can be carried on heat-treated wheels without shelling.

There are only two practical alternatives for keeping the contact pressures of the wheel on the rail within limits that can be tolerated by the rail without damage or shortened life. One is control of the wheel load and the other is control of the wheel diameter. Theoretical and photo-elasticity studies show that internal stresses resulting

(Continued on page 45)

HOT-BOX STATISTICS

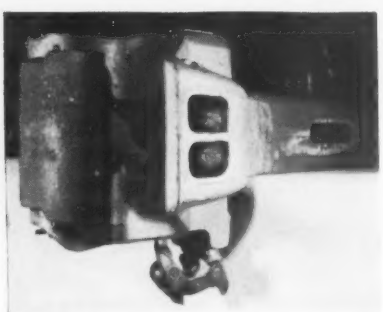
	Cars set off between terminals with hot boxes		Miles per car set off
1955	142,051		242,233
1956	169,286		209,479
1957	187,036		182,435
1958	156,470		200,417
1959	157,471		202,390
	Pads	Waste	
1960			
Jan.	2,329	5,887	324,954
Feb.	2,261	5,549	323,155
March	2,566	7,429	274,195
April	1,900	10,296	223,494
May	1,846	11,212	213,342
June	1,795	14,934	159,354
July	1,945	16,540	136,076
August	2,140	15,120	150,362
Sept.	2,142	12,132	173,549
Oct.	2,146	7,373	286,604
Nov.	2,083	3,557	439,965
Dec.	2,314	3,201	441,394
Total	25,467	113,230	225,975



Reduced handling costs and some reductions in duration of station stops may result from two container car experiments which are under way on the passenger trains of two railroads. Containerized express shipments are being handled between New York and St. Louis by the Pennsylvania on cars developed to handle REA Express containers (left). The Frisco is moving both mail and express on its "Will Rogers" between St. Louis and Oklahoma City in containers which move on Trailer-Train car (right) that has been fitted with container hold-down gear and steam line.

Hand Brake

The new Klasing non-spin vertical wheel hand brake features a sealed roller bearing for the wheel shaft and sealed-in life-long lubrication of all working parts. The brake is packed with No. 2 lithium grease. Other features include SAE 1045 forged-steel components, a pressed-steel hand wheel, and a zinc-plated chain for increased corrosion resistance. The device is said to exert equal power at all stages of piston travel and to provide powerful, uniform braking with minimum effort. Full release of the brake is accomplished by two counterclockwise turns of wheel. AAR Certificate No. 36 has been assigned. *Klasing Hand Brake Co., Dept. RLC, 20 Henderson st., Joliet, Ill.*



Couplers of High-Tensile Steel

The Type E freight-car coupler is now being produced in McConaloy, a high-tensile, nickel-chrome-moly steel developed by McConway & Torley. In addition to high-tensile and high-yield characteristics, these couplers, it is said, will withstand greater impact; remain operational even under the most severe climatic conditions, and reduce equipment maintenance costs. *McConway & Torley Corp., a division of Elliott Machine Corp. of Baltimore, Dept. RLC, Pittsburgh 1, Pa.*

Freight-Car Liners

Tests in actual service are said to show that contamination resulting from the shipment of raw hides can be eliminated through the use of liners fabricated from special laminated paper. Clean-up is accomplished by removing and destroying the liner which covers car floor and walls to a height of 54 in. Because no salt is needed, cost and deadweight are also reduced. *Kennedy Car Liner & Bag Co., Dept. RLC, Shelbyville, Ind.*

Hopper-Car Adhesive

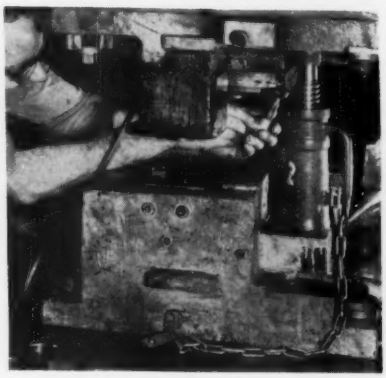
Polystix, an adhesive unaffected by -20 to 250 deg F temperatures, permits handling finely ground products without expensive clean-up when product cakes on container walls. Brushed around interior edges, it forms a pressure-sensitive area to which polyethylene film will adhere. Polyethylene sheets can be stripped and new layers applied on same Polystix coating. *Adhesive Products Corp., Dept. RA, 1600 Boone ave., New York.*

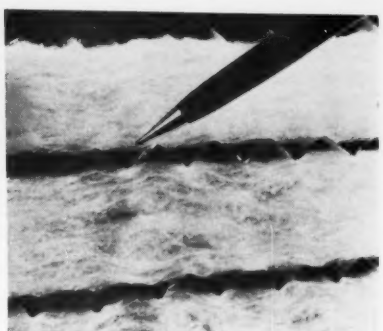
Unloading Nozzle

An entire car can be unloaded with three connections from double-ended nozzles on opposite hoppers. The nozzles are designed for suction unloading from either side of car, and product flow is controlled by a GATC design rotary valve. The rate of flow is regulated by manual rotation of the valve. In transit, air-tight nozzle caps provide weather-tight protection when properly secured. *General American Transportation Corp., Dept. RLC, 135 S. La Salle st., Chicago 90.*

Safety Press Block

Saf-T-Bloc is a device developed to assure maximum support of power presses during die servicing operations. It replaces old style steel blocks and wood wedges and is used for rapid snubbing of upper and lower dies while cleaning, changing, or shapening dies, or performing other maintenance tasks on the presses. The device, a modified version of the bell base screw jack, consists of three parts. A single base casting with integral handle houses a steel screw. The top of the screw is knurled for easy hand adjustments while on the press. A stop washer at the base of the screw prevents raising beyond safe limits. The unit weighs approximately 11 lb and is available in various capacities and raises. It is attached to the press with a short length of chain and a safety plug. Once the plug is removed from its position in the power control panel, all power to the press is automatically cut off. *Duff-Norton Jack Div., Duff-Norton Co., Dept. RLC, Gateway Four, Pittsburgh 22, Pa.*

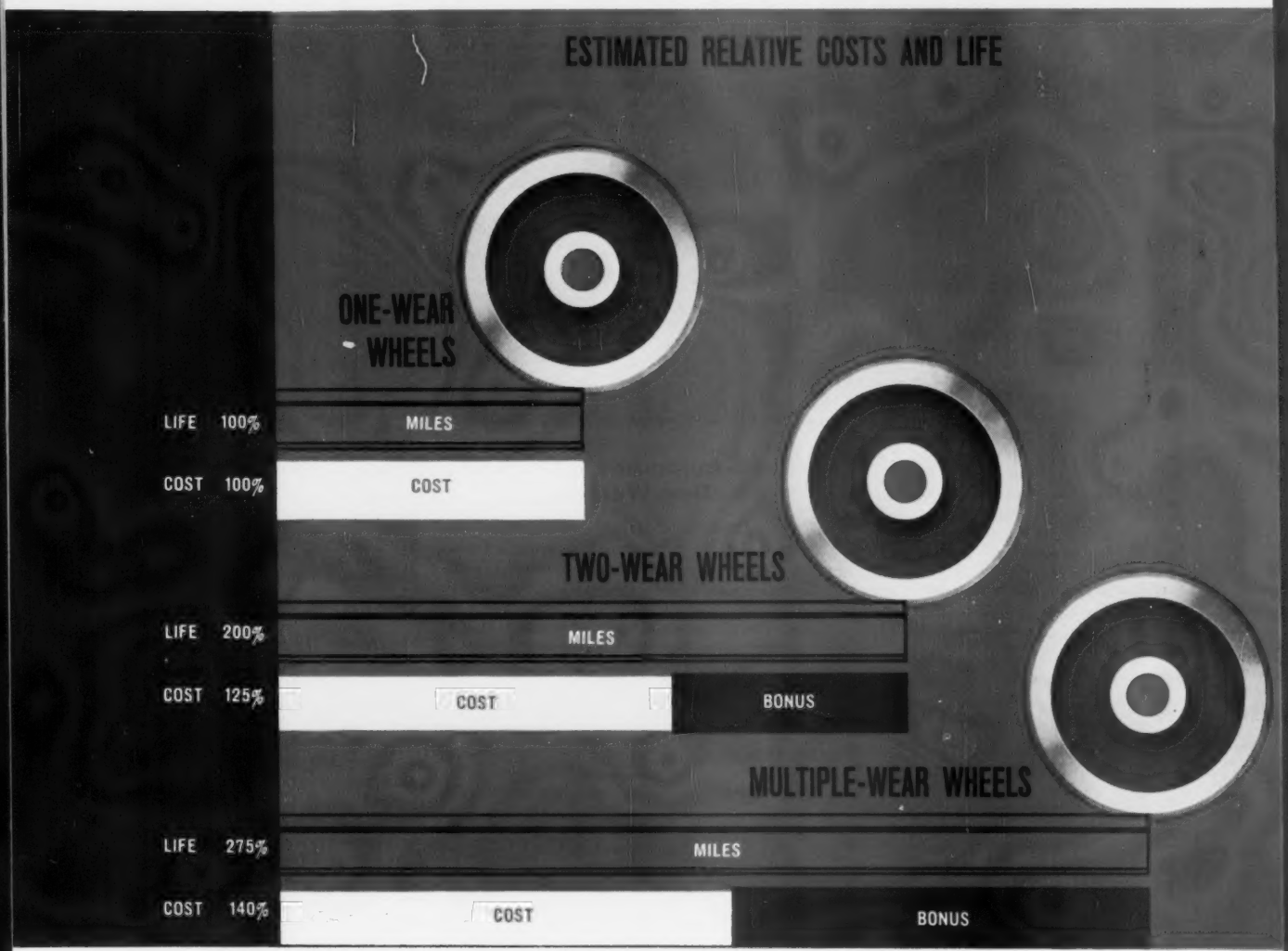




Reefer Insulation

Isoflex-k20 insulation consists of multiple laminated layers of vinyl-coated corrugated aluminum foil and glass fiber spacers. The vinyl protects the foil from oxidation and corrosion, thus maintaining a high degree of reflectivity. It also acts as an adhesive in the laminating process. In addition to its thermal efficiency, the insulation is said to remain resilient, non-combustible, and dimensionally stable under temperature extremes, and not to sag or collapse when subjected to vibration or other stresses. *Union Carbide Plastics Co., Div. of Union Carbide Corp., Dept. RLC, 270 Park ave., New York 17.*

How to *reduce* wheel costs



EDGEWATER TWO-WEAR AND MULTIPLE-WEAR

rolled steel wheels

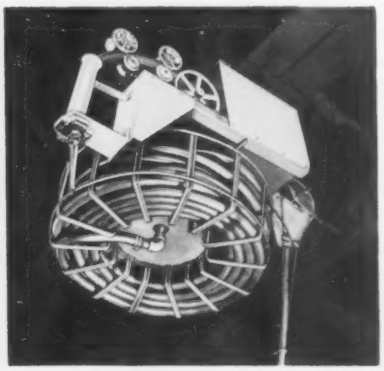
Not only do Edgewater rolled-steel wheels provide a substantial per-mile cost saving, but also an extra measure of safety They are made on the world's most powerful circular rolling mill. The Edgewater process produces wheels that are tough and hard – give long life under heavy loads and high speeds.

If you are looking for savings, here's a good place to start!

EDGEWATER STEEL COMPANY

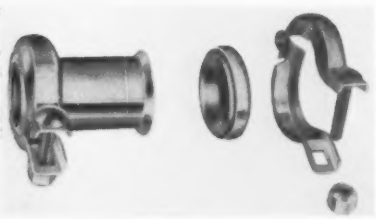
P.O. Box 478, Pittsburgh 30, Penna.

WHAT'S NEW IN EQUIPMENT—*(Continued from page 10)*



Electric-Powered Hose Reel

The vertical spindle in the Zierco electric powered hose reel makes possible a gravity hose coiling system which eliminates kinks and tight coiling which cause hazardous snaking on payed-out hose. Six aluminum rollers pay-out and take-up hose at a rate of 100 fpm. The reel can be wall or ceiling mounted. Capacities range from 50 to 500 ft, depending upon hose size. *Zierden Co., Dept. RLC, 3815 S. Kinnickinnic ave., Milwaukee 7, Wis.*



Pipe Coupling

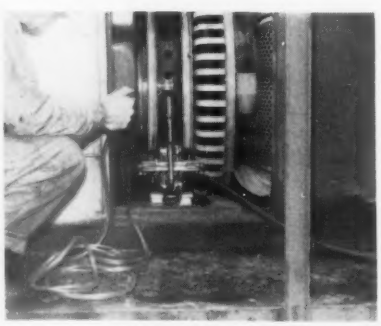
The improved Flexmaster pipe coupling is available in sizes from ⅜ to 4 in. and in lengths from 2 in. through 36 in. Its gasket is fully contained in the gasket retainer to assure uniform pressure of the gasket against the pipe and sleeve. The coupling meets ASA requirements for 150 psi service with temperatures from minus 40 deg F to plus 250 deg F. Special gaskets for higher temperatures may also be obtained. *Marman Division, Aeroquip Corp., Dept. RLC, 11214 Exposition Blvd., Los Angeles 64, Calif.*

Safety Solvent

Turco-Solv has been designed for in-place-spray-cleaning of motors, generators, switches, control panels, rheostats, and other electrical equipment. Controlled evaporation is said to allow the solvent to stay wet and working long enough to clean thoroughly in a minimum of time. Solvent vapors in the air are also greatly reduced, minimizing, toxicity and flammability. No hand-wiping, rinsing, or further chemical processing is needed. The solvent is non-corrosive and non-conductive and can be used on all metals, paint and varnish. *Turco Products, Inc., Dept. RLC, 24600 S. Main st., Wilmington, Calif.*

Semi-Automatic Production Welder

The Innershield Squirt Welder, for use both on machinery and structural fabricating, continuously feeds a tubular, self-shielding electrode through a 24-oz welding gun that is manually supported and guided along the joint being welded. A d-c motor generator supplies power for the welding range of 350 to 600 amp. Standard welding gun cable length is 15 ft. *Lincoln Electric Co., Dept. RLC, Cleveland 17, Ohio.*



Diesel Engine Barring Device

The pneumatic Power Bar permits one man to bar an engine over for inspection of rings, pistons, cylinder liners or for re-set timing. The device fits in the cradle used for manual barring and operates on 80 psi shop air. Inching control is provided for accurate timing. The unit also facilitates work on generators. *Circuit Engineering, Inc., Dept. RA, 1565 San Marco blvd., Jacksonville 7, Fla.*

Spring "Shok" Device

The Model L 177232-36 Liquid Spring Shok is designed for a full stop, without impact, of a fully loaded freight car or missile rail car operating at up to 12 mph. The compressibility of the all-liquid content (3.83 gal) eliminates the use of gas or air, providing full damping. At 18-in. travel, rated energy absorption is 460,000 ft-lb. Preload spring force is 16,000 lb, with an end load of 32,000 lb for restoring position. Volume is 861 cu. in. *Taylor Devices, Inc., Dept. RLC, 200 Michigan ave., North Tonawanda, N. Y.*

Diesel-Powered Trackmobile

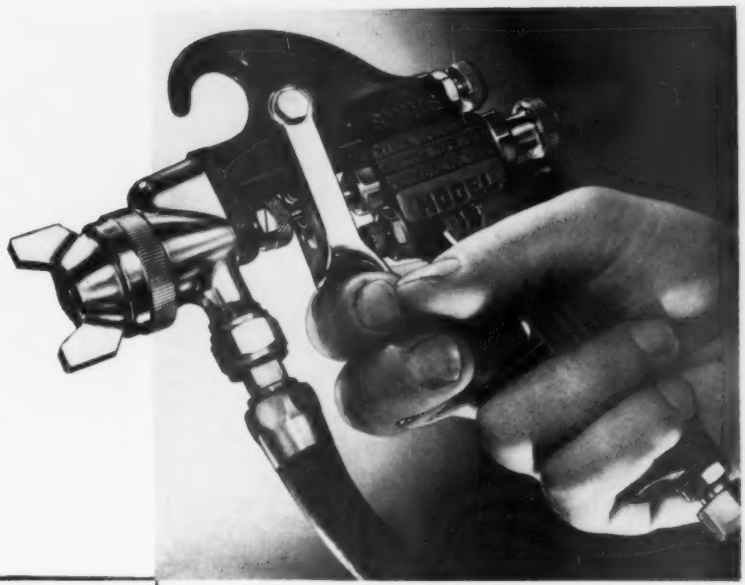
The Trackmobile is now available with a Cummins four-cylinder, four-cycle, valve-in-head diesel engine rated at 105 hp at 2,500 rpm. Three earlier models are gasoline-powered. *Whiting Corp., Dept. RLC, Harvey, Ill.*

A full line of equipment for low-cost RR maintenance

Binks Model 18 Spray Gun

Especially designed as a heavy-duty production gun. Ideal for applying paints, coatings, car cements and cleaning solvents. Stands up under continuous operation . . . handles any kind of finishing material.

In addition to the Model 18, over 100 other guns to choose from . . . each one for a specific job, from touch-up to applying multiple component materials.



Airless Painting Equipment

Maximum coverage and considerable paint savings. Paint goes where you want it . . . on the surface, not into the air. Ideal for indoor or outdoor use.

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Eliminate costly in-between step . . . transferring materials to another container before spraying. Now, move materials directly from original container to the spray gun.

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EDITORIALS

Direction for Progress

I first started playing football in the days when "first down" was made with a five-yard gain. A good lineman was expected to get so low to the ground that he could get under his opponent and push or lift him back. Then one day I decided to stand up and give my opponent a little added push to the ground. From this point of vantage, I suddenly discovered I could locate the position of the man with the ball and I could frequently stop him.

Now football has become an open running, passing game. Similarly, also has transportation. Once upon a time the railroads had little competition except with each other. Now with their major competitors on the highways and in the air, the railroads need to do some sharp looking, thinking and fast footwork.

In his report on rail failures, which is summarized in this issue, G. M. Magee, director engineering research, AAR, has reported on what heavy loading is doing to wheels and rails and has had the temerity to suggest that progress may be getting off limits. He indicates that some railroad thinking may need reorientation.

In recent years, car capacities have been increased until car-wheel loadings exceed those of many locomotives. Journal sizes have been established to meet load requirements. Heavier and stiffer rails make for better and safer track which requires less maintenance and causes less rolling resistance. Light rail, sometimes referred to as "rubber rail," causes each wheel to be constantly climbing out of a valley as the train moves along.

The heavy rail disposed of most of the troubles of the light rail but the evidence offered by Mr. Magee indicates that its very stiffness may have accelerated the incidence of other difficulties; namely, that of split rails and shelled wheels. These, it would appear, are brought about by the flow of metal caused by increasing unit pressures at the point of contact between the wheel and the rail.

Rivalry between departments may cause mechanical department men to question Mr. Magee's findings since he says little can be accomplished by making changes in rail or track structure. Rather, he suggests that needed improvements may be effected by increasing wheel diameters, by using heat-treated wheels, by developing multiple-unit cars for heavy lading, by going to six-wheel trucks, or by limiting car capacities to keep wheel loads within specified limits. He offers figures to show how much multiple-unit cars would reduce track maintenance.

It remains, of course, to be determined if any changes are immediately necessary and, if so, which may be employed to effect the best results in safety and economy. Such determinations require time, and Mr. Magee is to be congratulated for producing what he calls a "horseback analysis" and thus bringing the whole subject to the attention of the railroads with minimum delay.

Compatability between the flanged wheel on a steel rail is fundamental to the railroad industry. When trouble develops between these basic components, departmental considerations must not be prime factors in arriving at a decision. Mr. Magee has stood up to see where the ball is. It is this kind of thing that some refer to as fourth dimensional thinking. It opens up the game. It is a guide for progress in the right direction.

Changes for the Better

We are on the threshold of great changes in the railroad industry. In some areas, such as mergers, we are far beyond this point.

These changes are taking place and will take place because an embattled railroad industry is determined to use every weapon in its arsenal in the fight to regain the railroads' rightful place in serving our national transportation requirements and the nation's interest. The all-out battle is being waged on many fronts: in the fields of legislation, mergers, new transportation concepts, new services and technological developments.

The AAR made public last month a declaration it termed a "Magna Carta for Transportation." AAR President Daniel P. Loomis minced no words in releasing the declaration when he said the railroads "are tired of being the punching bag for destructive government policies and are determined to obtain equal treatment." The "Magna Carta" asked for four freedoms: freedom from discriminatory legislation; freedom from discriminatory taxation; freedom from subsidized competition; and freedom to provide a diversified transportation services.

Mergers are making rapid changes in railroad maps. A few have been completed; about ten more are anywhere from the discussion to the application stages. They are a means of effecting economies essential to a healthy railroad industry. They reduce unneeded physical plant, eliminate duplication of facilities and waste, and improve services. Some displacement of personnel, top to bottom, is inevitable, but arrangements to cushion personnel changes have been made in mergers already effected and will undoubtedly be made in mergers to be completed.

Piggyback service reversed the trend toward the exclusive movement of certain commodities over the highways. It has combined the inherent advantages of rail and highway transportation. This spectacular development also has the teamsters "screaming" that it is discriminatory and unfair, a "shoe on the other foot" situation. This change in railroad operations is only a sample of the kind of service that is sure to be adopted—an integrated transportation system using the advantages of rail, road and water vehicles.

Technological developments have been made and are being made to serve the railroads' needs in this battle for that large part of the transportation volume they can supply so economically to the nation's advantage. The mechanical departments should keep informed of these developments and be ready with the technical know-how when the time comes, as it surely will.

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- On another road, a similar 70-ton hopper car was rebuilt, with half the underframe riveted . . . and the other half bolted with RB&W High Strength Bolts. Impact and shakeout test results were fine. Inspection after six months of service showed many rivets loosened—but all bolts still secure.

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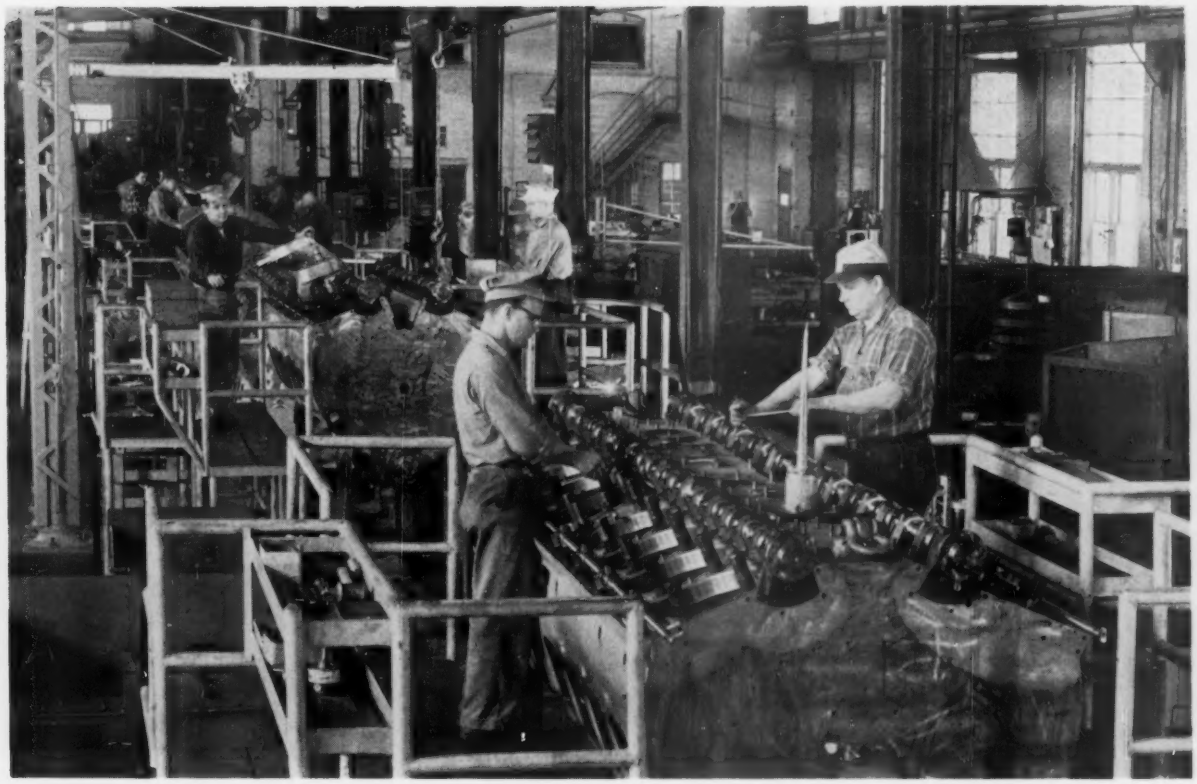


Engine build-up is a three-station operation with platforms arranged to simplify the work. Overhead crane moves engines from station to station.

Production Lines for ACL Engines

Increase production and higher work quality are the result of introducing assembly-line methods.

An important phase of the Atlantic Coast Line program to control equipment maintenance costs and improve work quality was the establishment of a diesel engine rebuild line at the Waycross, Ga., shop. The system, in operation for four years, places the assembly of complete engines on a production-line basis. Subsequently, a similar arrangement was made for the reclamation of engine components. Component overhaul operations are arranged along individual conveyor lines. Engine rebuilding is performed along a five-station engine-overhaul line. The reclaimed components are delivered by their conveyors as near as possible to the appropriate engine-rebuilding stations.

While the engine-overhaul section consists of five stations, only the second, third, and fourth are actually assembly stations, as Station 1 is the disassembly area and Station 5 is the load-test and final retightening station.

Engine Assembly

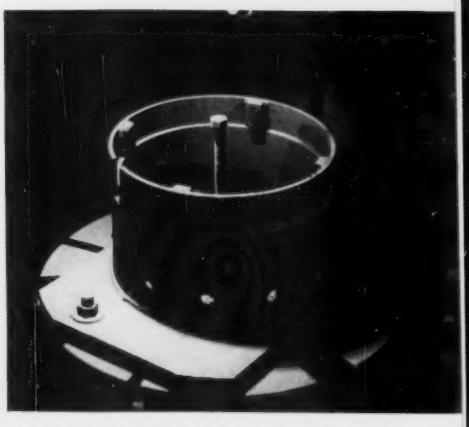
First assembly is at Station 2 where crankcases are measured, gaged, and checked for cracks. Camshafts and crankshafts are then applied at this station.

At Station 3 all power assemblies are installed and lead readings are taken. The engine and cylinder assemblies are water tested for leaks and the crankcase is applied to the oil pan.

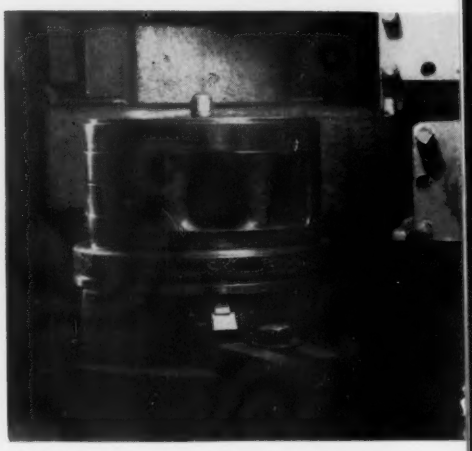
At Station 4 all accessory-end and gear-end equipment is applied. Cylinder-head-cover support frames, injectors, rocker arms and fuel lines are fitted to the engine. It is then timed. From this point, the engines are moved to the load-test room.

Practically all Coast Line diesel locomotives are General Motors units. This simplified the design of these production-line facilities and their tooling. Typical monthly output is 12 rebuilt engines. Component reclama-

Welded cylinder heads will be processed on boring mill and vertical lathes. Overhead monorail is used for moving heads between machines. Liners and pistons move on roller conveyors.



Jig on vertical lathe is used for the machining of unwelded cylinder heads.



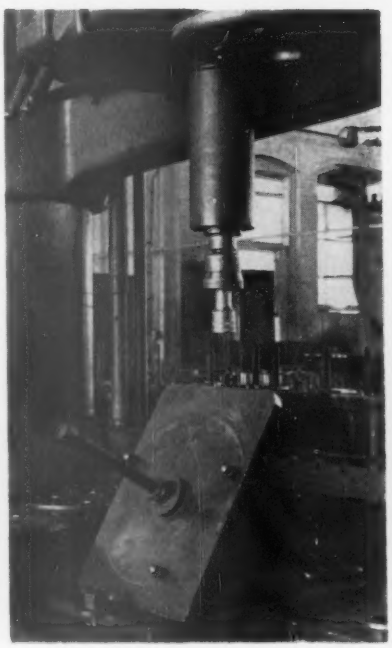
Welded heads are clamped in this jig for machining of their top surfaces.

tion facilities not only produce necessary parts for these, but also turn out material to be used for running repairs at the four maintenance points on the Coast Line.

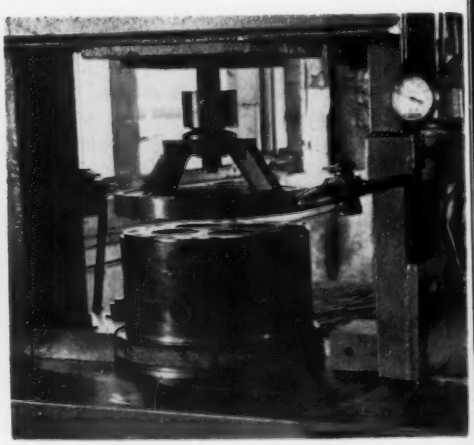
The five-station engine rebuild line, when stripping, rebuilding and load testing 12 engines per month, is manned by 20 machinists, 1 machinist helper, 2 sheet-metal workers, and 2 apprentices. When engines are being produced at this rate, there will always be an engine at each station, and the individual mechanics are assigned full time at specific stations.

Engine rebuilding, as the Coast Line now does it, represents a 39% reduction in forces from the original system in which each engine was completely reassembled at one spot. It has long been an ACL practice to load test and run-in its rebuilt diesels prior to their installation in a locomotive carbody.

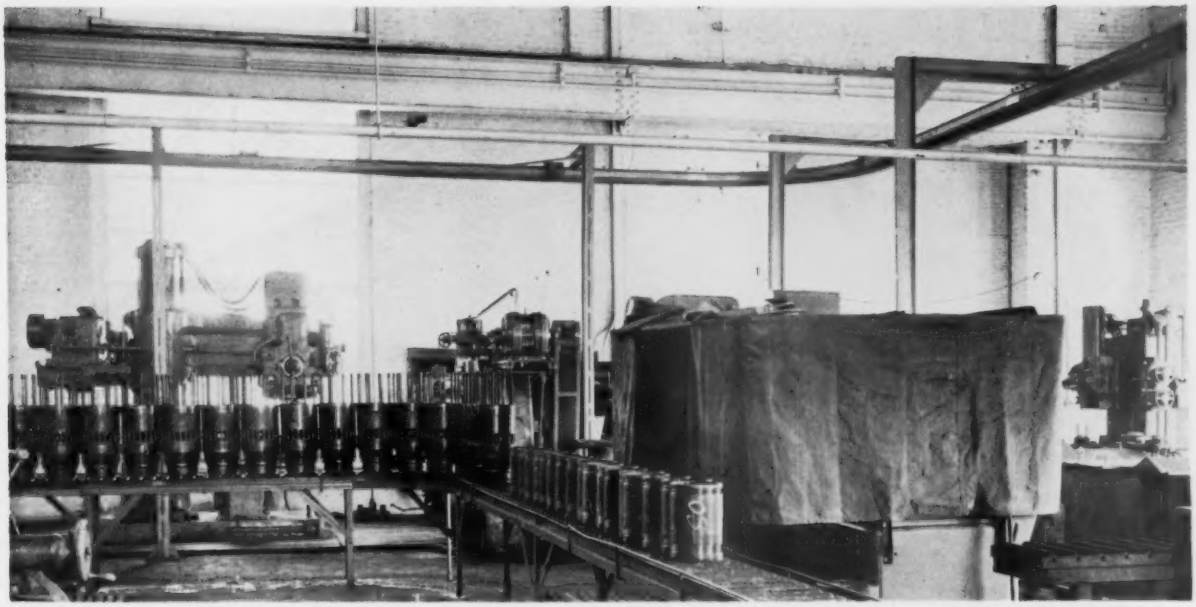
After almost two years of successful experience with the production arrangement for engine rebuilding, the ACL installed the engine component lines. Again, it was expected that costs would be cut and work quality improved. By eliminating manual handling of the power assembly com-



Cylinder-head jig on drill press is designed to machine mounting for cylinder relief valve.



Hydrostatic test jig is being lowered into place on welded and machined head.



Conveyor moves liners, pistons and heads past Magnaglo inspection station. Conveyor at right center moves pistons out for reconditioning.

ponents and by using the conveyors for live storage, manpower requirements were reduced.

Average monthly production of reconditioned engine components has been as follows: cylinder heads, 276; pistons, 276; connecting rods, 276; governors, 20; water pumps, 32; lube-oil pumps, 12; scavanging oil pumps, 12, and injectors, 276.

About 65% of the heads, pistons, rods, and injectors are used on the engine assembly line; the rest are used for running repairs at Waycross and other locomotive maintenance facilities. About 25% of the governors and water pumps are used for running repairs. Additionally, all other components for the entire fleet of 596 diesel units, such as air compressors, blowers, fans, steam, generators, rocker arms, and speed records, are reconditioned in this shop.

While only the power assembly components — heads, pistons, rods, and liners—are processed on the production line, the ACL has attempted to make the reconditioning of the other components as efficient as possible. Component reconditioning at the rates indicated above requires 29 machinists, 2 apprentices, 1 helper, and 2 laborers. This represents a 25% reduction in the force necessary before the conveyorized arrangement was installed for processing parts for power assemblies.

Liner honing device is used to prepare liners for reuse in rebuilt power assemblies.

Head, with iig clamped over water passages, is ready for hydrostatic test. Heads which pass go on for valve grinding.

Jig holds five heads for grinding of valve seats and assembly of valves in head.

Covered gondola, designed for handling extra-long extrusions, has aluminum body which is claimed to increase payload by 8 tons.

Aluminum Body for 85-ft Gondola

The 85-ft covered gondola recently put into service by the Rock Island was developed by Harvey Aluminum to demonstrate the economies which are made possible by mounting an extruded aluminum superstructure on a conventional steel underframe. It is designed to protect long metal shapes in transit and to make possible rapid loading and unloading. The Rock Island leases the gondola from North American Car Corp.

The car has completed a dozen trips —over 10,000 miles—handling shipments of strategic materials from California to Georgia, Kansas, and Washington. Extra long lengths of aluminum tubing and structural shapes were moved in each instance.

Loading the car proved easy. Four aluminum, watertight roof sections, each about one-third the weight of equivalent steel construction, cover the car from end to end. Center sections are removed first, then the ends. These covers can be lifted by any small crane. It takes only 10 to 15 min. to remove and replace the sections.

The 85-ft steel piggyback car, which serves as the underframe, was stripped and the side sills prepared for application of the custom-designed aluminum sections that make up the sides. These sections are extruded aluminum channels 82 ft long and 25 in. wide. They were made in a 12,000-ton hydraulic extrusion press at the Harvey Aluminum plant in Torrance, Calif. For each side the channels are riveted together, three high. The completed side is then riveted to the side sill. More than 90% of the joints in the carbody were made with Huck steel rivets. Before assembly, the channel flanges were punched for riveting and were cut and coped for application of the extruded aluminum hat-section side posts which are welded in place. The aluminum car ends are each reinforced with three 8 x 20-in. extruded aluminum I-beams tapered to their tops.

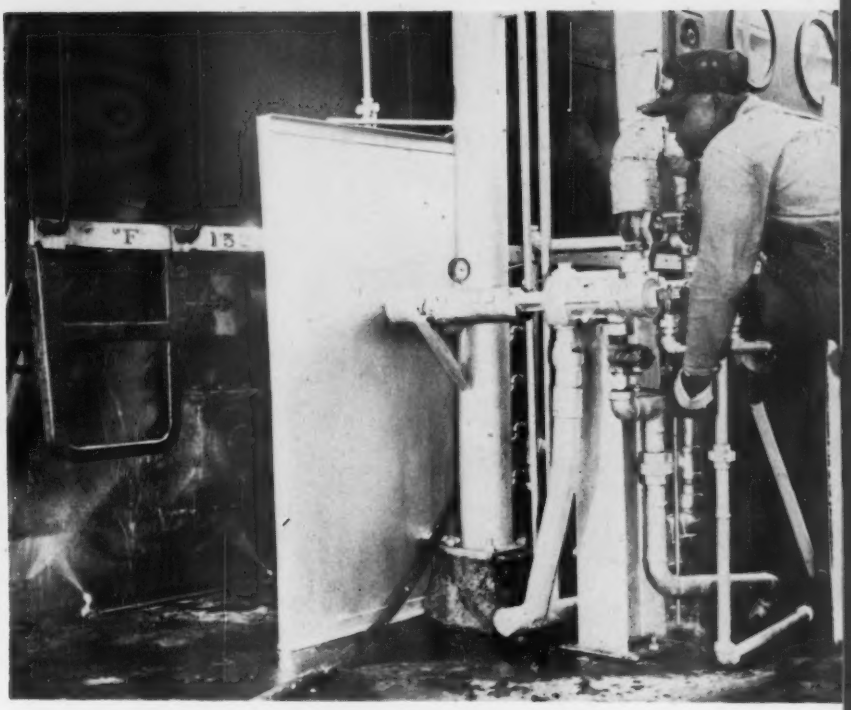
All side and end assemblies were fastened together and secured to the underframe with ½-in. Huck galvanized-steel lockbolts, or rivets. Aluminum-to-aluminum contact surfaces were painted with a primer before assembly. Aluminum-to-steel contact surfaces were prepared with a zinc chromate primer. All joints were caulked with a heavy coat of Alumilastic before assembly.

For the car roof, panel-type aluminum extrusions were fabricated into four 20-ft sections equipped with lifting eyes and stacking spacers. Running-board sections are permanently applied to each section. Three clamps on each side of each section hold it in place on the car body.

The car is equipped with easy riding trucks having one-wear wrought-steel wheels and roller bearings. Rubber draft gears are installed. Safety appliances are steel, installed in accordance with ICC and AAR requirements. The steel deck, underframe, brackets, stiles, etc., are painted aluminum.

The light weight of the completed car with aluminum superstructure is 75,900 lb and the load limit, 134,100. The aluminum superstructure weighs less than 10,000 lb. A comparable steel body and roof, it is estimated, would add eight tons to the empty car weight. Inside length between end sheets is 80 ft 4 in.; inside width, 8 ft 2⅞ in., and inside clear height, 4 ft 11¼ in. Cubic capacity is 3,240 cu ft.

Jet Cleaning For Santa Fe Diesel Wheels



Each jet has discharge capacity of 4,000 gph. Cleaning compound delivery can be varied.

To clean the insides and outsides of the wheel plates of diesel locomotives passing through the washing facility at the Argentine, Kan., Terminal, the Santa Fe has installed special high-pressure wheel-cleaning equipment. A four-unit locomotive, moving through this wash rack at 1½ to 2 mph, is completely washed, including wheels, in about 6 min.

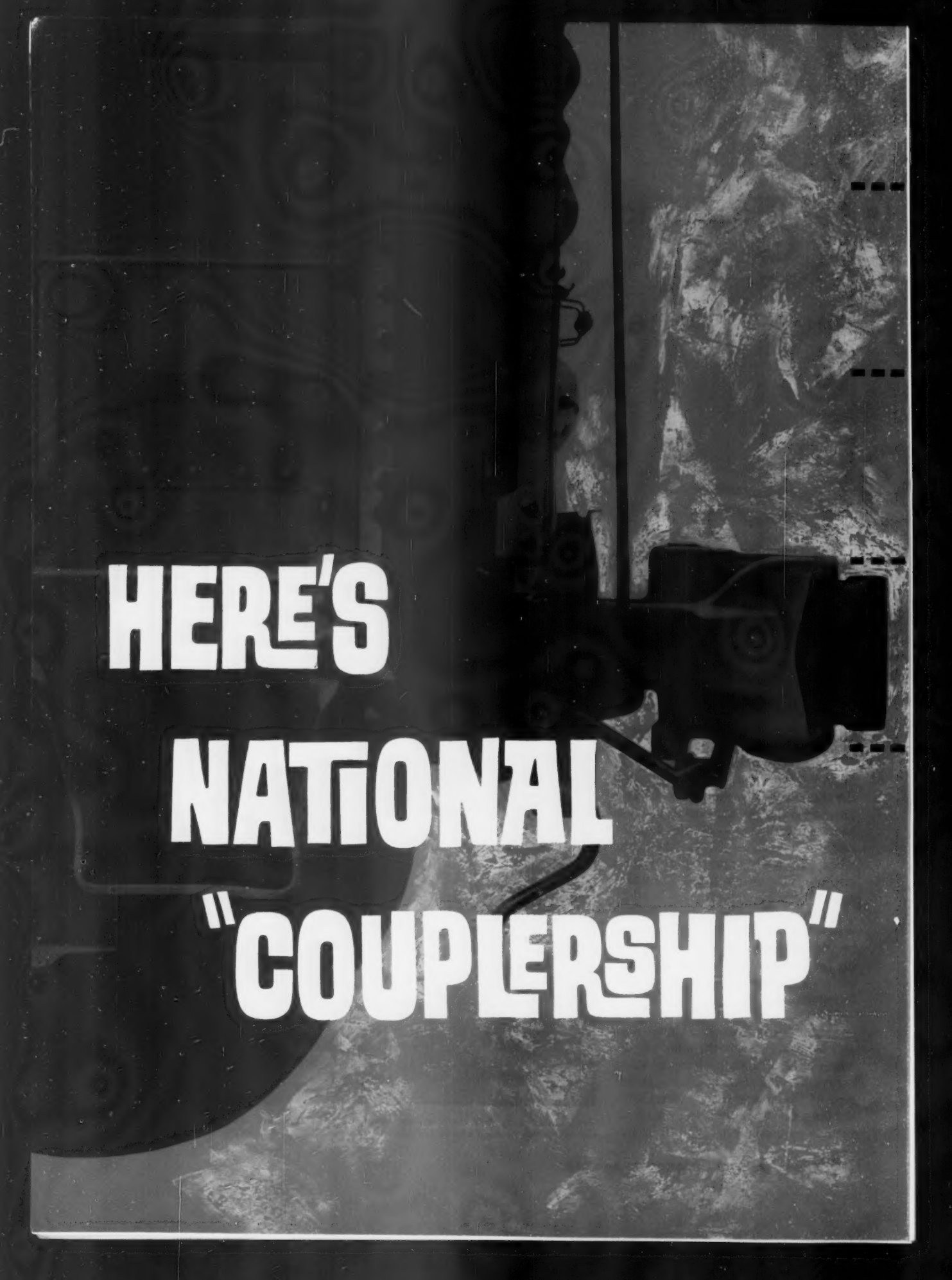
The wheel-cleaning installation, placed between the initial and final brushes at the wash rack, consists of Sellers 4,000 gph high-pressure hydraulic jets and washing sprays. Two jets, in parallel on one side of the wash rack, supply the spray nozzles with the cleaning mixture. Each serves the wheel and truck spray piping system on both sides of one rail of the wash-rack track.

Cleaning detergents, mixed with hot water and fuel oil in agitating tanks in the supply house, are fed by circulating pumps to the jets. Water and fuel-oil proportions are varied with different detergents.

On each side of each rail, within a space of 7 ft, are the four spray nozzles which clean both sides of the wheel plates. In addition to this set of sprays, the jet also supplies a standpipe which has eight spray nozzles for washing the truck sides and a single vertical pipe connected with four elevated nozzles which wash running boards and hoods of switcher and road-switcher locomotives.

All locomotives are washed each time they pass over the fuel servicing inspection facility at the completion of a trip. Prior to washing, incoming locomotives are inspected and initial servicing is completed at the fueling station. Inspections are made regardless of whether the locomotive subsequently moves to shop for inspection or repair, or to outbound tracks for dispatching.

Vee nozzles along rails clean wheels; standpipe jets clean truck and carbody sides. Cleaning solution drains to sump and is recirculated.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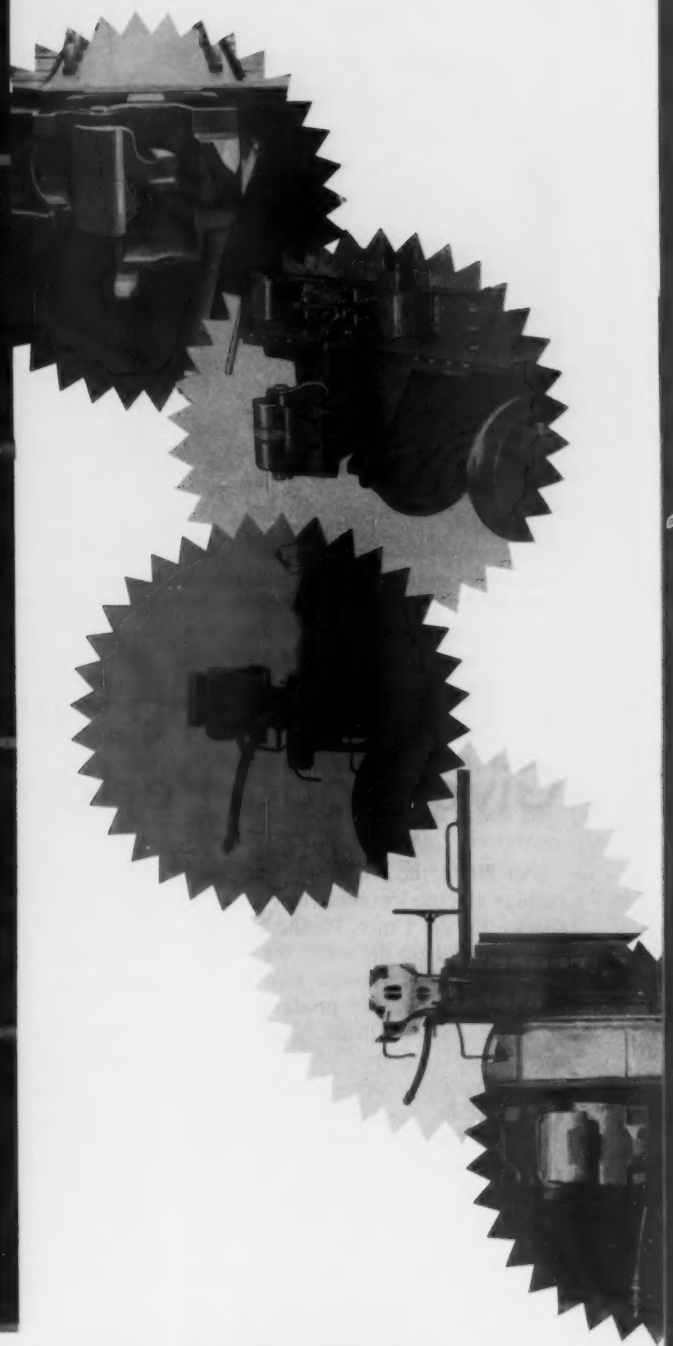

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U.P. 8,500-Hp Turbines Give Good Performance

All 30 of the world's largest gas-turbine electric locomotives will be in service on the Union Pacific by July. General Electric delivered the first of these 8,500-hp, 420-ton locomotives in August 1958, and production has continued at approximately a one-per-month rate since then.

Improvements developed from operation of the first turbines have been incorporated as subsequent locomotives were built. This field development is expected to reduce maintenance and improve the reliability of the entire fleet. The power plant is a simple-cycle, single-shaft, two-bearing machine.

The 30 locomotives will supplement an existing fleet of 25 single-unit, gas-turbine locomotives placed in service between 1952 and 1954 (RL&C, Aug. 1952, p 85). They are powered by four-bearing gas turbines rated at 4,850-hp at 1,000 ft elevation and 80 deg F ambient.

From a paper by H. Rees, senior mechanical engineer, Union Pacific, presented before recent Gas Turbine Power Conference, ASME, held in Washington, D.C.

Four 8,500-hp locomotives were delivered in 1958 and seven in 1959. By October 1, 1960, nineteen of these locomotives were in main-line freight service between Council Bluffs, Iowa, and Ogden, Utah. Rail distance between these terminals is approximately 1,000 miles. Elevation varies from 1,033 to 8,013 ft. Ambient temperature can be anywhere between —40 deg and 110 deg F.

By October 1, 1960, the nineteen 8,500-hp turbines in service had amassed a total of over 95,000 fired hours. One turbine had operated for 10,218 hr.

The work potential of these locomotives can be judged from their performance during 1959. Because seven locomotives were delivered progressively through that year, total service was 90 locomotive months. A total of 1,076,772 locomotive-miles was operated an average of 11,911 miles per locomotive month. The big turbines hauled 5.3% of the UP total freight gross ton-miles.

During September 1960, with 19 locomotives in service, the average was 11,776 miles per locomotive, and 12.6% of the UP freight gross-ton-miles was handled. During this same month, 75 new SD24 and 30 new GP20 diesel-electric units assigned in comparable service on the same district averaged 12,110 and 12,322 miles per locomotive unit, respectively.

Service conditions for these 8,500-hp gas turbines are severe. In stationary service, a gas turbine generally operates with few starts and stops under a comparatively steady load. Locomotive service imposes frequent starts and stops with a load that varies. Because of railroad clearances, there is practically no space available for the filtering and silencing of inlet air. The close confines of the locomotive carbody make inspection and maintenance difficult. The turbine must withstand the vibration and shock loads of railroad operation.

While these rugged conditions are ideal for accelerated testing of equipment, it is almost axiomatic that equipment which has given excellent trouble-free service in air, marine, and stationary installations will develop unexpected troubles when operated in a railroad vehicle. The 4,870-hp, four-bearing gas turbines placed in locomotive service from 1952 to 1954 developed problems in the first 10,000 hr which did not show up in identical units in stationary service until years later, if at all.

The General Electric frame size 5 gas turbine used in the 8,500-hp locomotives is a simple-cycle, single-shaft, two-bearing machine having a 16-stage axial compressor and a two-stage turbine operating at 4,860 rpm. It has ten reverse-flow combustion chambers which operate on treated residual fuel after starting on diesel fuel.

This turbine, when ordered in1957, was an entirely new model. Many modifications were developed on the manufacturer's test stand before the first locomotive was delivered in 1958. The need for others was discovered in field service. Improvements developed as the result of service problems were immediately incorporated by the manufacturer in turbines not yet delivered.

Service to date indicates that the basic design concept of this two-bearing gas turbine is fundamentally sound and that it will prove to be a long lived, minimum maintenance machine.

There have been 22 occasions to

(Continued on page 34)

PFE Determines Insulation Requirements...

Fresh-Produce Mechanical Reefers

Mechanical refrigerator cars which Pacific Fruit Express has recently placed in service for shipments of fresh fruits and vegetables are expected to yield significant data about insulation requirements for such service. The 25 Class R-70-11, "fresh-produce, semi-envelope" cars, built at the PFE Los Angeles shop, are designed to maintain ladings in the 30 to 70 deg F temperature range.

While these cars have the same structure, power plant and refrigeration equipment used for the 1,000 all-purpose R-70-12 cars completed last year by PFE (RL&C, August 1960, p 29), less insulation is needed because the new cars will not be used for frozen-food ladings which require temperatures to minus 10 deg. F. It is hoped, by avoiding the extra costs involved in providing "deep freeze" temperatures, that the transportation costs for fresh fruits and vegetables moved in mechanical cars can be held at reasonable levels.

Only basic structural difference between the two classes of cars is that the 25 experimental units have been equipped with cushion underframes. Ten of the cars have the Hydra-Cushion device in which the impact forces are absorbed and dissipated as an inclined casting passes over a vertical hydraulic cylinder, compressing brake plates built into the floating sill (RL&C, May 1957, p 53). Fifteen cars have Super-Cushioned underframes in which the impact forces are absorbed by high-capacity ring spring units.

While the cushion underframe makes the length over coupler pulling faces 57 ft 7 in. as compared with the 55 ft 11 in. of the R-70-12 cars, all other exterior dimensions are the same. Overall length is 52 ft 2¼ in.; height to top of running board, 15 ft 1 in., and side door openings, 8 ft wide. As with the R-70-12 cars, the carbody is all welded with external side posts. Roofs and ends are also of all-welded design. This construction simplifies application of insulation and tends to reduce heat infiltration. The increased light weight, 90,000 lb as compared with 86,300 lb, is due to cushion-type underframes which are used instead of the conventional arrangement used on the 1000 Class R-70-12 cars.

The Class R-70-11 cars have 2 in. less insulation in the walls, floors, and ceiling, producing an increased inside length, width, and height, and a greater cubic capacity.

Although the higher minimum temperatures are maintained, the new cars have the same refrigeration system used in the R-70-12 cars. This assures full interchangeability between the two classes of cars. It also permits direct comparison of system performance of cars with different insulation thicknesses.

While four different types of insulation are used, all cars have 5-in. rigid foamed plastic panels in the floor with foam-in-place insulation between the side sills and the outer floor stringer.

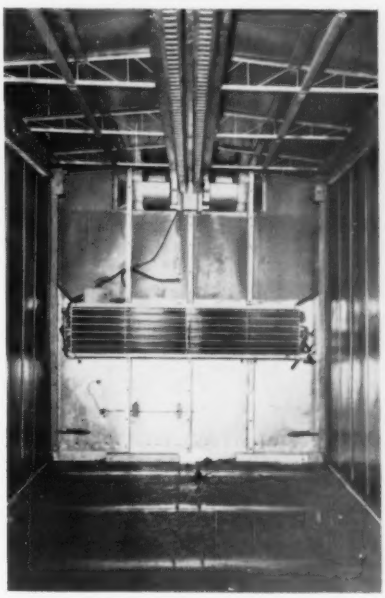
Five cars have 5-in. foamed plastic panels in walls and ends, and a 4-in. thickness of Fiberglas blanket, plus 3 in. of multi-layer insulation in the roof. Another five cars are completely insulated with the multi-layer insulation—5 in. in the walls and 7 in. in the roof.

Corrugated polystyrene panels, 5 in. thick, are used in the walls and B ends of five cars, along with 5 in. foamed-plastic panels in the A-end bulkheads. For the roof, 7 in. thick polystyrene panels are laid upon the ⅜-in. plywood subceiling.

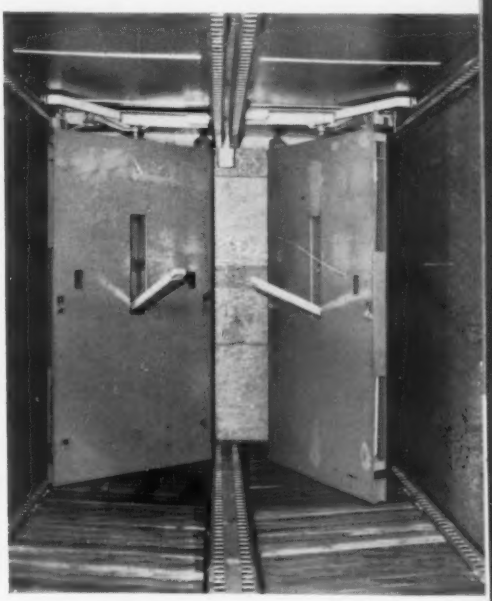
The 10 cars with the Hydra-Cushion underframe have 2 in. of blanket

(Continued on page 28)

Plastic-faced insulating panels installed in car shell. Wavy channels in surface act as flues.



Evaporator is mounted on bulkhead. Roof has been installed; trusses will support ceiling.



Load dividing gates are supported between tracks mounted under roof and in floor.

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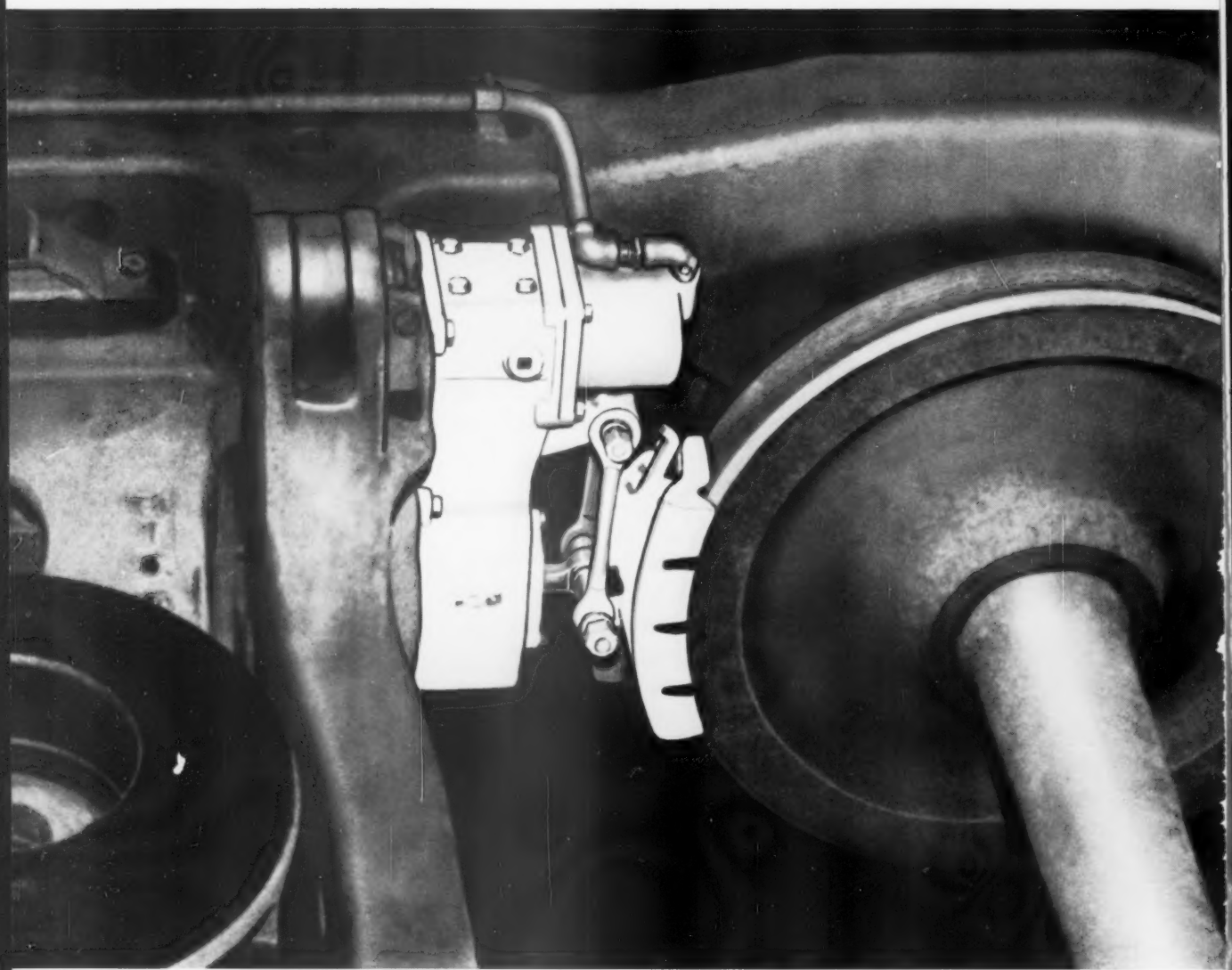
Contribute outstanding over-all economies on



Success of this nationally famous Chicago & North Western Push-Pull fleet is reflected by its 3-year growth

1958	1959	1960	1961
13 CARS	49 CARS	165 CARS	213 CARS

with Cobra Shoes*

Chicago & North Western push-pull suburban fleet

MR. C. J. FITZPATRICK, President
Chicago & North Western
Says:

"Cobra Shoe life and improved wheel performance have been a major factor in the over-all economies realized in the operation of our new Push-Pull Trains."

TOTAL ANNUAL SAVINGS PER CAR
$437.00
in extended Brake Shoe and Wheel Life

PLUS FACTORS:
Dead Weight Reduction of 2.5 Tons Per Car
Rigging Eliminated
Satin-Smooth Running
Satin-Smooth Stops

*Registered Trademark of Railroad Friction Products Corporation

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

Fiberglas and 3 in. of multi-layer insulation in the walls and ends, and 7 in. of Fiberglas and layer insulation in the roof.

All cars have 8-ft doors with an inner lining consisting of a corrugated plastic panel which is filled with expanded polystyrene insulation. Floor racks—aluminum stringers with herringbone hardwood slats—have adequate strength to support fork-lift trucks. Floor drains at each end of the lading space facilitate interior cleaning.

Reducing the thickness of insulation gives the R-70-11 car a lading space of 3,625 cu ft—451 cu ft more than that of the R-70-12 cars. Inside length between load divider gates is 45 ft 2 in.; inside width, 9 ft. Both dimensions are 4 in. larger than comparable measurements of the R-70-12 cars. Inside height, floor rack to ceiling, is 8 ft 11 in., and the available clear lading space is 8 ft 6½ in.

All 25 cars are equipped with movable steel load dividers, making it possible to sectionalize lading space into three compartments of various lengths. These dividers are equipped with positive locking devices to absorb heavy impacts.

Refrigeration equipment drives include a 10-hp semi-hermetic compressor motor, a 2-hp condenser fan motor, and a 1-hp evaporator fan motor. Power is supplied by a 20-hp diesel engine which drives an alternator. Fuel tank capacity is 500 gal.

The diesel has an actuating device that allows the engine to operate at two speeds—1,200 rpm and 1,800 rpm. The 1,800-rpm engine speed produces 60-cycle, 220-volt current; 40-cycle, 150-volt current is generated at 1,200 rpm. The battery is a 12-volt nickel-cadmium type, charged through a silicon rectifier by the alternator.

When equipment is started, the engine operates at low speed for a 2-min warm-up period, controlled by a time delay relay. A solenoid valve then brings the engine to full speed, simultaneously loading the compressor. The refrigeration system operates at full speed and fully loaded until the thermostat temperature is 2 deg above the thermostat setting. Engine speed then drops to the low range and the compressor operates until air temperature reaches the thermostat set point when two of the three compressor cylinders are unloaded. The refrigeration system cycles out 1 deg below the thermostat set point. Heating and defrosting are accomplished at the low speed. Car temperatures are controlled by mechanical thermostats which operate on a temperature-sensing mercury-bulb principle.

Car thermometers have a rigid straight probe installed through the car side below the evaporator. If a car thermometer becomes defective, it can easily be replaced while the car is under load.

A plastic tube with a spring-loaded cover, applied through the bulkhead just below the thermostat probe, makes it possible to check return air temperatures while the car is loaded. A pocket thermometer can be inserted to check the accuracy of the thermostat setting or car thermometer.

New Problems in Car Interchange

This is the twenty-sixth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs To, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the Rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

Do the present rules require railroads to stock roller-bearing assemblies at repair points for repairs to foreign cars? (279)

No.

When lighting is furnished for loading or unloading baggage or express cars not equipped with permanent lighting fixtures, should the expense involved be assumed by the handling line or the car owner? (280)

It should be assumed by the handling line.

Is it proper to render a charge vs. car owner for in-date testing of air-brake equipment on passenger cars? (281)

No. Present rules do not provide for such charge or for the application of in-date test stenciling.

Where journal lubricating devices are found to be water soaked, requiring service treatment and the application of car oil, who is responsible for the expense involved? (282)

Such expense should be assumed by the handling line.

Is it proper to apply to foreign cars Grade B coupler knuckles which have been repaired by welding? (283)

No. This practice is now prohibited.

Do repair forces exercise their own judgment as to when journal lubricating devices require renewal, or do they have established conditions to guide them? (284)

New paragraph (h-4) of Rule 66 provides equitable conditions under which journal lubricating devices shall be renewed.

Is it proper to request defect card from delivering line for a container missing from car received in interchange which is not used in TOFC service, the car itself not having been involved in unfair usage? (285)

No. See Section (11) of Rule 22.

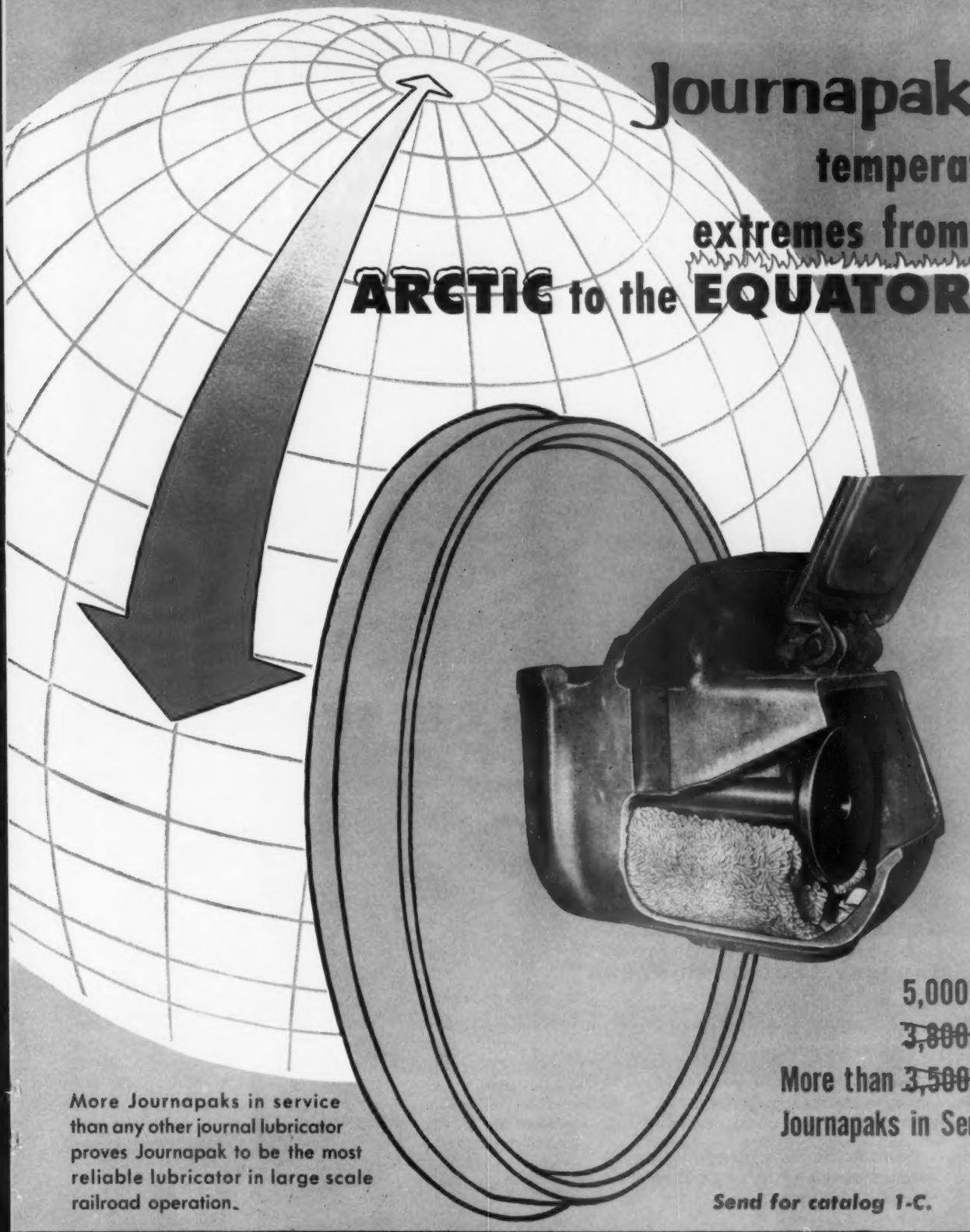
Is defect card protection provided for removable roofs and lading covers of open-top cars? (286)

Yes. These items are subject to the same rules as the car itself.

When freight cars are given heavy repairs, involving more than 100 man-hours, what attention must be given to truck side frames? (287)

Truck side frames must have all of the accumulation of dirt, heavy paint, rust, and scale removed before they are returned to service, so that, if any progressive fractures subsequently develop, they can be readily detected and repaired before complete failure occurs.

Journapak for temperature extremes from the ARCTIC to the EQUATOR...



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Journapaks in Service

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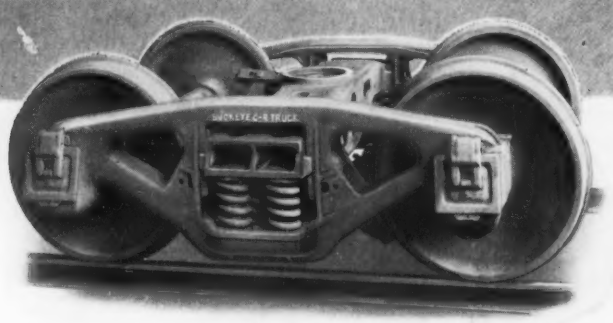

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- Built-in durability with highest quality materials protects against wear and breakage.
- Maximum friction bearing areas assure extended service with minimum maintenance.
- Periodic service inspections indicate service life will outlast average freight car.

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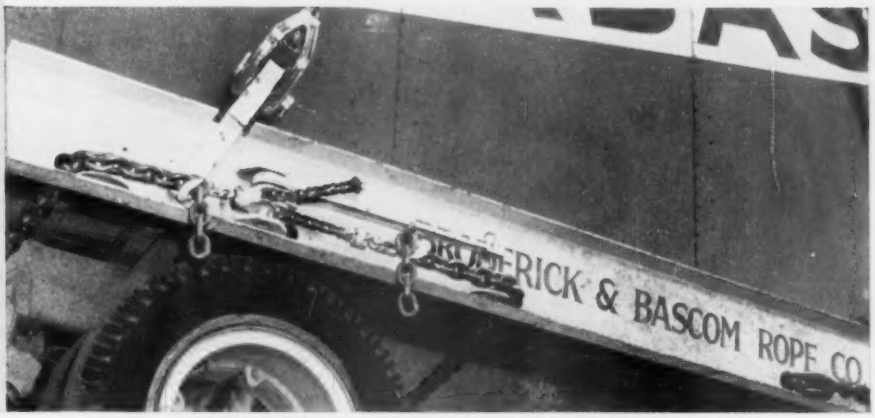
THEY PLANNED ON YELLOW STRAND TO HOLD DOWN COSTS

on piggy-back loading operation

Lifting rig uses four type M1-BT Yellow Strand Braided Safety Slings, 8 parts of ½" rope, and twin thimbles, allowing rope to run completely around thimble.



Close-up showing hitching method. Alloy chain snubs channel-iron side rails tightly. Yellow Strand patented twin thimbles secure sling bridles to beam.

Type M1-TT Sling

Yellow Strand Sling Experts and Wabash R.R. Develop Unique Low-Cost Piggy-Back Lift

One of the many advantages you get with Yellow Strand is service. Yellow Strand experts helped develop this economical lifting rig taking advantage of equipment already in use for other purposes. The assembly is versatile, quickly and easily applied, and handles different trailers with minimum adjustment. The strong, durable Yellow Strand Braided Slings will lift forty tons. What's your sling problem? Call your Yellow Strand representative anytime for expert help – for the very finest in all types of slings.

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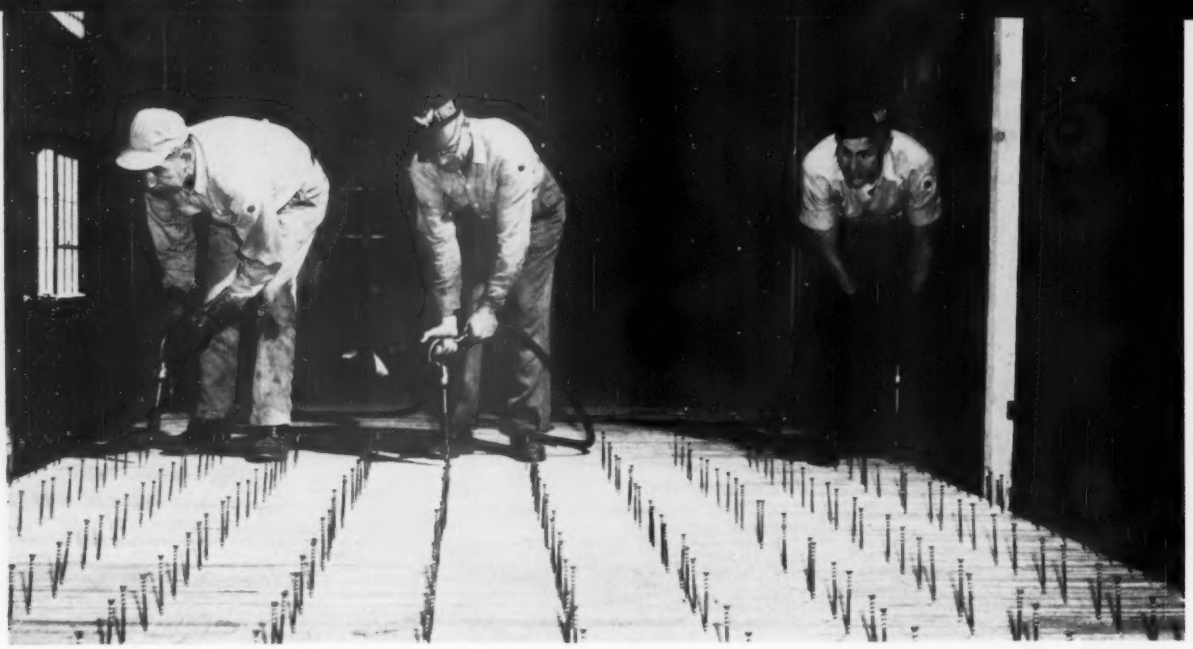
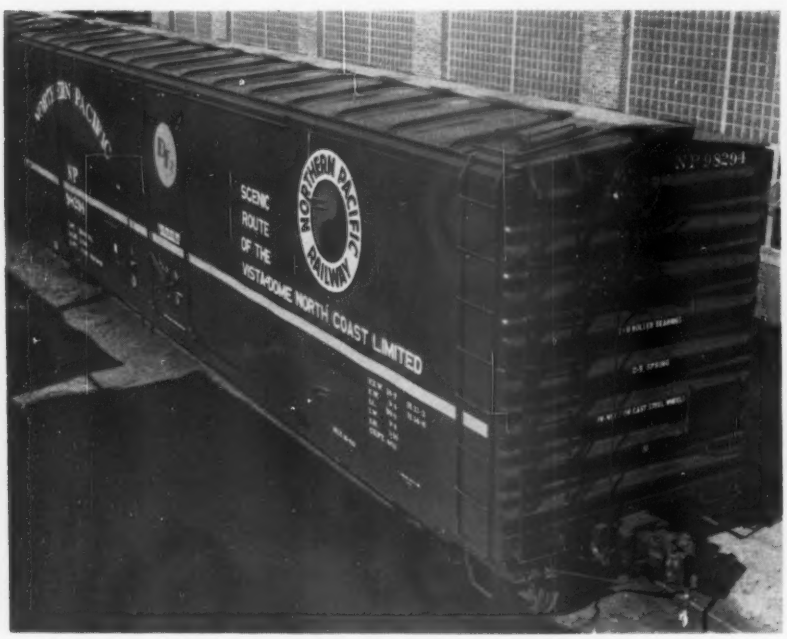


Rapid nailing of heavy flooring was accomplished with air-operated nail driver. Three men proceeded through car, driving 1,350 spikes.

Northern Pacific Builds 'RBL' Cars

Insulated box cars recently completed by the Northern Pacific are being used to transport tin plate from eastern mills to the West Coast and to handle eastbound movements of canned goods and other products which require damage-prevention devices. The 150 RBL cars built at the NP's Brainerd, Minn., car shop are designed primarily for the coiled-tin-plate service and have a capacity of 4,611 cu ft. The 9-ft door openings facilitate loading and unloading with lift trucks widely used by all types of shippers today.

Other features of the 50-ft cars include the road's heavy-duty, all-welded steel underframes equipped with the Barber Cushion-Tube device (RL&C, March 1959, p 19) and International Steel all-welded steel sides. Lading protection is provided by Evans DF-2 and Pacific Car & Foundry Car-Pac loader equipment. The ASF A-3 ride control trucks are equipped with one-wear wrought-steel and cast-steel wheels, $3^{11}/_{16}$-in. travel springs, and SKF Expediter 6 x 11 roller bearings. Roofs and floors are insulated with 4-in. of Fiberglas. Side walls and ends have 3 in. of Fiberglas.



Insulated box cars for coiled tin plate are equipped with lading devices and with floating-tube type of cushion underframe.

The car has a light weight of 74,800 lb and a capacity of 134,000 lb. Inside width is 9 ft $4^{1}/_{16}$ in.; inside height, 9 ft 10½ in., and inside length, 50 ft $^{1}/_{16}$ in. Length over end sills is 50 ft 8¼ in.

Installation of the Doweloc 2⅜ in. hickory flooring was completed in "record" time by using Chicago Pneumatic CP-5XBND air-powered nail drivers. The 50-ft floor was completely finished in 45 min by a three-man crew driving 1,350 double-grip 5½-in. spikes. The nail driver can be operated from the shop air line or a small portable air compressor. A metal sleeve encloses the nails while they are being driven, eliminating the hazards associated with hand driving. The compact, lightweight tool can drive any nail from the 20-penny to 60-penny size.

Who Robbed Gus?

By Ken Wright

The mechanical refrigerator car business had been increasing steadily. Everyone was getting plenty of experience, even Old Gus who initially had been very obstinate about these "new fangled playthings." Gus grudgingly took assignments on the cars and, finally, as he worked on more of them, became very interested.

One morning Big Jim, the boss, was outlining and assigning jobs. Several mechanical reefers were in for inspection and maintenance. Big Jim, realizing that Gus did not have too much experience, assigned him a car which was to be started and cooled down for loading later in the day. This would be routine, because the car had been inspected earlier.

A little later Gus rushed up to Pete breathlessly. "Pete," he exclaimed, "I've got trouble! Someone has stolen the battery and some other things out of that car I'm supposed to be starting. Will you come over and tell me what all is missing so I can report it to Big Jim?"

Pete looked at Gus incredulously. "Are you sure you looked the car over completely?" Pete asked. "You know that some cars have the battery in a box underneath instead of in the machinery compartment?"

"Look, Pete," said Gus, "when I got to the car, I checked the fuel tank and then I checked the engine oil and the coolant levels. When I got ready to start the engine, the Start button was missing. You can see the hole in the panel where it should be. I then checked to see if they had moved the button, and that was when I found the battery missing. By then I knew I'd better get someone who would know exactly what was missing."

When they reached the car, Gus tried to show Pete the empty battery box. Pete, however, immediately began to examine the engine and suddenly started to laugh. "I'm sorry I laughed, Gus, but you will too. Look here."

Pete was pointing to a device applied to the engine in place of the regular starter motor.

"So what?" asked Gus, "I don't see anything laughable."

"If you will look closer, Gus, you will see this isn't an electric starter, but a hydraulic starter. Here is the reason you don't have a battery or a Start button."

Gus still didn't see anything funny. "Why don't they stay with something standard?" he asked. "What was the matter with the electric starter? It's good enough for automobiles and other small engines. Do they just try to keep things fouled up?"

"This isn't the only thing being tried to eliminate the electric starter," Pete replied. "I understand that an air starter is also being tested. The real aim is to eliminate the battery and battery charging system."

Gus looked puzzled. "Why? What's wrong with them? Do they give that much trouble?"

"Generally starters, generators and batteries don't give much difficulty in normal service. On mechanical reefers you do encounter conditions not completely normal. Car vibration sometimes damages starter bearings. Motion of the car also affects the vibrating type voltage regulator, causing battery charging failures. The automotive type of charging generator has brushes and commutator as well as bearings and belts. Generators have frequently been located at the back of the engine where they were overlooked and were not properly maintained.

"When battery temperature is lowered, its capacity also goes down. During cold weather when lubricating oil is stiff, turning a cold engine over can be a real problem. Some cars have been equipped with high batteries—the ones hung underneath. Bigger batteries require added protection against the shocks bound to occur in freight service. Think what the last battery for your automobile cost you. Then remember that we are talking about 24-volt batteries. You will get an idea of the costs involved."

"Gosh, Pete, I never thought of that. Do you think this hydraulic starter will solve all of those problems?"

"Don't get me wrong, Gus. The battery starting system isn't all bad; it just has problems. Any time you make changes to eliminate problems, you generally get yourself some new and different problem. You must then decide which procedure is least troublesome and which gives the greatest return for your money. The best way is to try the different methods and then evaluate them.

"Some cars are now equipped with an alternator and rectifier system which takes the place of the direct-current charging generator. The alternator produces a-c which is rectified to d-c of the proper voltage for battery charging. This eliminates most of the problems encountered with the belt drive, commutator, brushes, and generator bearings. While this would appear to solve a lot of problems, it now develops that we encounter blown fuses, overcharged batteries, undercharged batteries, and rectifier failures."

"Gosh, Pete, you sound like the voice of doom," Gus exclaimed. "Help me get this engine started before I decide its just not worth it. Where's the power for this hydraulic starter? Don't tell me I have to pump it up by hand."

"You might have to," responded Pete. "Generally you won't. If it is cold weather, I'd suggest that you do it to insure plenty of pressure."

Pete pointed to the starting instruction. It read:

Ambient Temperature, deg F	Pressure Gage, Psi
Above +40	1,500
+40 to 0	2,500
Below 0	3,300

"I'd suggest you always make sure that you have at least the pressure indicated on that chart. The system has an accumulator, a reservoir which is divided into two sections by a piston. On one side of the piston you have the hydraulic system and, on the other side, a charge of nitrogen gas. As hydraulic pressure is built up, the piston will move to compress the nitrogen. When the engine runs, an engine-driven pump maintains this pressure. Provided there are no leaks in the hydraulic system, the pressure then should hold indefinitely.

"With this type of starting, the engine is actually turned over faster than is the case with the electric starter. This is an advantage in cold weather. However, a word of caution; you should get three starting cycles with a warm engine and a fully charged hydraulic system. If the engine is cold, you will have to be absolutely sure that

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This is the sixteenth article in this series discussing the operation, maintenance and trouble shooting of mechanical refrigerator cars.

the engine is ready to be started, because you will not be able to crank and crank. If it doesn't start the first time, you will have to build the pressure back up with that hand pump, and that takes a lot of pumping.

"So," Pete continued, "if the outside, or ambient, temperature is below 45 deg, you better use a cold-weather starting aid. This is the same we use on cars with electric starters—ether in a plastic capsule or metal cartridge. It would be best to add the ether capsule just before moving the starting lever, or, if possible, during cranking."

"Wait a minute, Pete," Gus said. "What did you mean about being sure that the engine is ready to start?"

"First," Pete answered, "be sure that the stopping device, usually a pull knob or handle, is in its running position. This is generally a choke and may sometimes stick so it will not return to its normal position. Depending on the type of engine, you may have a fuel priming pump. If you have such a pump, use it to insure that fuel is reaching all of the injection system. This will conserve the starter charge.

"Those engines not equipped with priming pumps don't generally require priming, unless fuel filters have been changed. Then, regardless of the type of starter, it is always a good idea to completely fill the filter housings with fuel. Remember, no air pockets. Be sure the safety control is set for starting. It may have the engine air shut off, making it impossible for the engine to start."

"That's an awful lot to remember when you're in a hurry to get an engine started."

"No, Gus, it isn't too much. Most of these things you do automatically. Just check those things needed to make an engine run: air, fuel, coolant, lubrication, and, finally, rotation to produce ignition. You just have to be more careful. Frequently after an engine has been cranked and cranked, then we start looking for trouble. Make your checks first.

"Now, Gus, see the starting lever on this hydraulic gadget? When you move that, you do two things. You move the starter pinion into engagement with the flywheel ring gear and you open the valve in the hydraulic system. When the engine fires, close the valve quickly to conserve the hydraulic charge and to prevent the starter from over-running. You should expect that, if the engine starts, the engine-driven pump would restore the pressure charge. Why conserve it? Remember that the engine might not continue to run—it might be a false start. Your pressure would be gone and it would mean you would have to pump it back up by hand. Over-running the starter isn't good either."

Following Pete's explanation, Gus started the engine easily. The two watched it operate. Suddenly Pete turned and started away. He called back, "Here I've been fooling with you, and Big Jim will be along shortly wanting to know why I'm not done with my job on that other car."

Things were again normal. Pete was unhappy.

U.P. 8500-Hp Gas Turbines

(Continued from page 24)

partially or completely open up a turbine. The turbine casing has a horizontal split which permits removal of the top half with the turbine in the locomotive. All parts can then be removed and replaced, except for the compressor rotor blades. Three turbines were opened when failed inlet silencer parts entered the compressor and damaged compressor blading. Ten turbines were opened for scheduled inspection and modifications. Nine turbines had unscheduled openings because of turbine troubles which required immediate repair. Based on these nine unscheduled openings for 95,727 turbine hours, an average of 10,636 hours per turbine is obtained. This reflects the initial field operation of the new design turbine. With design improvements already made, this average is expected to improve.

After four failures in turbines, a program was set up to apply a new design of first-stage bucket sealing pins and second-stage bucket tie wires with crimped ends.

On March 29, 1959, the air inlet silencer of Locomotive 4 was found collapsed, evidently due to icing. A new inlet silencer was applied. No damage to compressor could be seen from the turbine inlet, and the turbine was not opened.

On April 19, 1959, the air inlet silencers on three locomotives collapsed due to an unusual weather condition which prevailed around North Platte, Neb. Weather conditions were favorable to icing of the screened opening of the inlet silencer. Ice formed gradually and eventually closed the openings in the screen. The resulting negative pressure inside the silencer caused it to collapse. New silencers were applied. Compressors were not opened, since visual inspection from the inlet end indicated that very little blade damage had occurred.

To prevent a recurrence of this type of failure, the manufacturer designed a shutter arrangement in the floor of the silencer which opens whenever the interior pressure decreases slightly and admits warm air from the carbody. These were manufactured in the railway shops and installed on all turbines.

Turbine accessories, such as fuel pump, hydraulic pump, fuel flow divider, exhaust control system, governor, lube oil pumps, atomizing air compressor, and vapor extraction blower, have performed quite well. There have been some road failures and delays.

Caps, liners, and transition pieces in the combustion chambers were not provided with serial numbers, and no accurate record can be kept. At the present, liners and caps are repaired at approximately 1,600-hr intervals, and transition pieces at 5,000 to 7,000 hr intervals. All are repaired by building up with welding, or by welding in new sections.

After starting on diesel fuel, automatic transfer is made to a specification type residual fuel having a viscosity of approximately 95 SUS at 210 deg F. Specifications provide that the weight ratio of sodium to vanadium be kept below 0.3, and the weight ratio of magnesium to vanadium above 3.0. Turbine performance on this type of fuel has been excellent. There has been no evidence of corrosion of hot gas parts due to fuel.

These turbines operate with a very clear exhaust, a marked improvement over the 4,870-hp turbine. In spite of limited space, the inlet air silencer does an excellent job of reducing the noise, with a minimum of pressure drop. Noise level at full load operation is comparable to a 3-unit diesel locomotive.

Vol. 4, No. 1

Railway Executive News

Published by Railroad Products Division, SERVO CORPORATION OF AMERICA

111 New South Road • Hicksville, Long Island, New York

SERVOSAFE® Hot Box Detective* here signals train crew automatically, if overheated journal bearing is detected on passing freight at remote spot on main line.

Automatic Alarm Patent Issued to Servo Corp.

Patent no. 2,963,575 covering automatic alarm hot box detection devices was issued Dec. 6, 1960 to Servo Corporation of America by the United States Patent Office.

The new patent covers a variety of computation and comparison methods for ascertaining and identifying hot box signals emerging at the output end of the detection devices.

Granting of this latest patent now protects with *three* patents various infrared detection systems pioneered and marketed by Servo Corp.'s Railroad Products Division.

The automatic alarm, according to Servo railroad spokesmen, represents one of the most significant developments in hot box detection since Servo marketed the first successful SERVOSAFE® Hot Box Detective* system in 1956.

This important railroad safety device, known commercially as SERVOLARM® equipment, has been incorporated in various Detective installations for several years.

It allows Detective systems to be used for automatically setting signals to stop trains with hot boxes and gives the railroads a broader choice of systems employing standard chart recording interpretation techniques or automatic control, depending on detector location and individual railroad requirements. ■

*Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857, and 2,963,575. Other U.S. and foreign patents pending.

FASTER FREIGHTS:

Railroads Straighten Track, Reduce Stops, Add Detectors to Speed Up Service...

"In the rugged mountains of northern Arizona, Atchison-Topeka & Santa Fe Railway workers are hurriedly laying the final sections of a new 44-mile strip of track that will slice through this region, unwinding sharp curves, and flattening steep grades.

"Farther north, Chicago & North West Railway freights now roll non-stop through fifty small towns between Chicago and Rapid City, S. D.

"To the east, Chesapeake & Ohio Railroad crews plant small metal boxes containing super-sensitive infrared heat detecting systems in roadbeds along sections of the line's track. The aim is to spot 'hot boxes'—overheated wheel bearings—before they cause time-consuming breakdowns.

"These seemingly unrelated events, separated by hundreds of miles, are aimed at a single objective: a further speedup of rail freight. Taking kinks out of winding track, scheduling fewer stops, and installing better equipment are three of the major methods the nation's railroads are using to achieve faster freights."

* * *

"The Chesapeake & Ohio and other railroads have eased the problem of delays caused by hot boxes by installing the special infrared hot box detection systems along sections of track. These devices, which sense the heat generated by a hot box, flash the danger signal to the nearest terminal, which relays the message by radio to the train's engineer.

"Thus, before serious trouble results, the engineer can stop the train or slow it down and avoid the even greater delay caused by a broken axle or fire. The C&O has 17 of the devices in service and plans to add another dozen in the near future."

THE WALL STREET JOURNAL
Dec. 16, 1960

The Atchison-Topeka & Santa Fe and Chesapeake & Ohio are two of the 28 major Class I railroads across the country that have adopted the patented infrared SERVOSAFE® Hot Box Detective* system for spotting dangerously overheated journal bearings on fast freights.

First railroad to install the Detective back in 1956, the C&O has found that even smokeless hot boxes on trains traveling at high speed cannot escape spotting by SERVOSAFE.

"I consider the Hot Box Detective to be one of the greatest aids to railroading in many, many years," C&O Vice President for Operations M. I. Dunn has stated. "Our tests have proved it 100 per cent effective."** ■

**CHESAPEAKE & OHIO RAILROAD
1958 Annual Report

RAILROADS REPORT:

Spot 20 hot boxes at one spot alone...

Writing in the *L&N Magazine* (Dec. 1960) on the railroad's experience with its SERVOSAFE® Hot Box Detectives*, Edison H. Thomas states: "*...just how effective the system is can be judged by the fact that the automatic (Detective system) at Cullman (Ala.) alone has spotted 20 incipient hot boxes, any one of which could well have caused a derailment had it not been discovered and corrective measures taken.*"

Efficiency as high as 100%...

Railroads using the SERVOSAFE Hot Box Detective report better than 90 per cent efficiency for the units...in some cases as high as 100 per cent for consecutive periods of six months or over.

Savings over $100,000...

One SERVOSAFE road reports savings of over $100,000 per installation per year, allowing amortization of the equipment in approximately one month's time.

'Wheel Checker' Sales Now Handled by Servo

Servo's Railroad Products Division has been granted exclusive worldwide sales rights for the *Wheel Checker*, a division spokesman announced.

System automatically detects broken wheel flanges and loose wheels on passing cars, squirting a shot of non-drying bright yellow paint on the wheel for quick identification. ■

3 SIMPLE STEPS TO REDUCE YOUR HOT BOX PROBLEMS

Any one of these steps will contribute to relief from the hot box problem . . . will help improve journal bearing performance and cut operating costs, too. Together, the indication is so promising that the feasibility of a 48-month repack period is now being tested.

Want proof? Try these quality Brake Shoe products to upgrade the bearing performance of your cars—see for yourself what they can do when the going is rough. For full details consult American Brake Shoe Company, Railroad Products Division, 530 Fifth Avenue, New York 36, New York.

A-1897

AMERICAN Brake Shoe COMPANY

Quality products cut your ton-mile costs.

1 Keep oil in box. New Absco dust guard helps keep oil in, dirt and water out. Engineered for long life. Fills the well . . . doesn't drop down onto journal when axle shifts laterally, doesn't get damaged when axle moves back. Yet it can follow under severe impact or misalignment.

2 Feed oil to bearing. Improved Absco lubricating pad* holds and feeds ample quantities of oil under all operating conditions. Simple, economical, durable, easy to install and remove. Can be effectively renovated for long life.

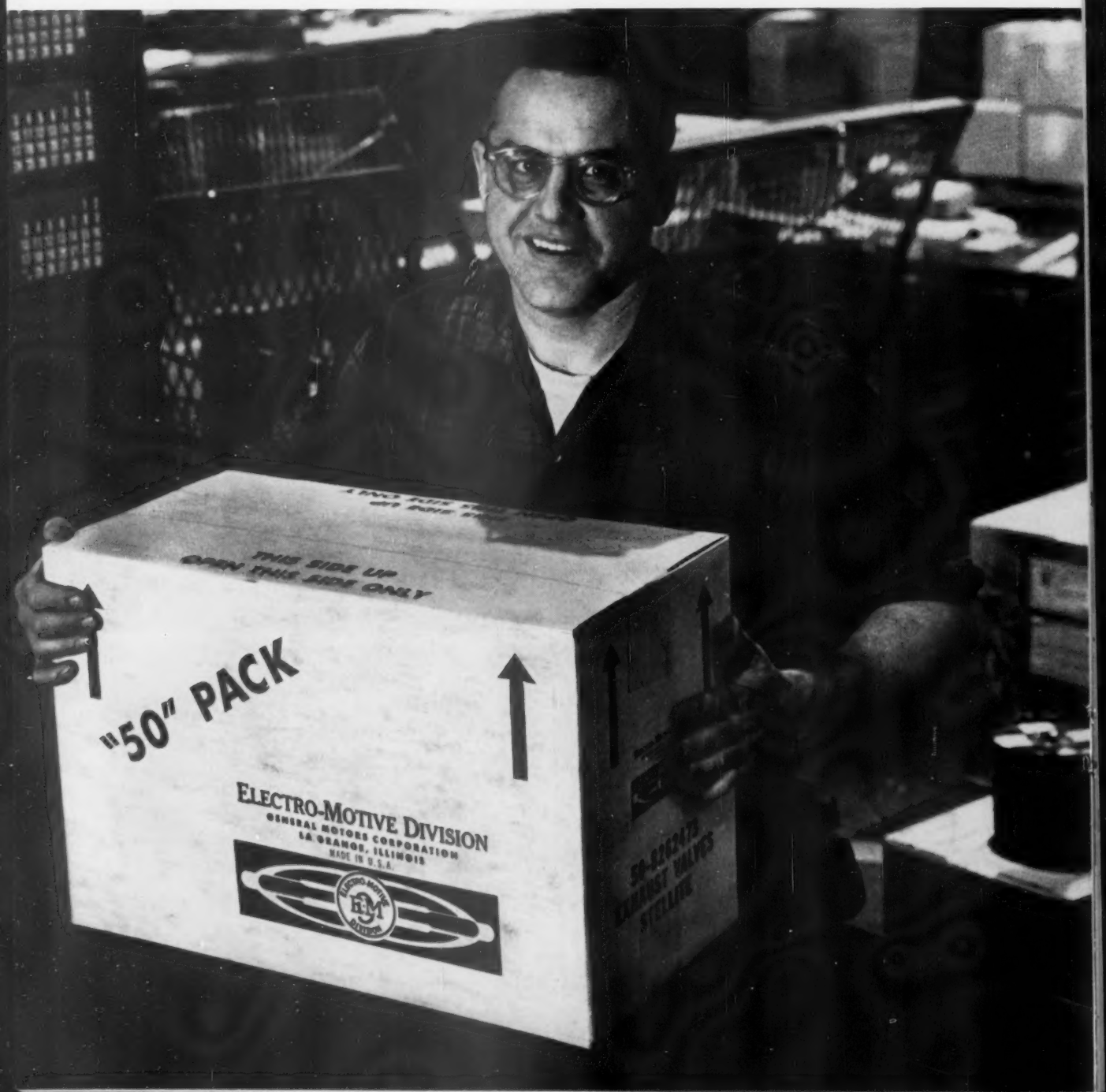
*A.A.R. conditionally approved.

3 Stabilize journal assembly. A quick, simple method is to install the Absco positive control flat back bearing† in place of the conventional steeple back bearing. No alteration or modification to the box or axle is necessary. Proved effective in road tests extending over the past 36 months.

†A.A.R. approved for limited application for test in interchange service.


ABSCO GUARD 5 1/2 X 10

"Electro-Motive's new '50' pack keeps valves in perfect condition always ready for immediate use, and far easier to reship, handle and store."



NEW, COMPACT CARTON contains fifty exhaust valves. These are proven Electro-Motive valves that make engines run smoother, perform better, last longer.

SHOCK RESISTANT TRAYS hold ten individually supported valves wrapped in protective VPI rust preventive paper. EMD exhaust valves are ready for immediate use.

VALVES ARE PROTECTED from oxidation even after the carton has been opened. Simply refold protective tray and replace in carton, sealing the valves below.

RE-USABLE CARTON can be conveniently stored in shop work area with full protection against damage then re-used for storing or shipping reground valves.

61 R-9

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EMD Field Loop Can Be Eliminated

Arrangement increases performance reliability and makes possible more braking in the low-speed range.

The field loop circuit on General Motors diesel locomotives makes it possible for enginemen to select the amount of dynamic braking necessary during m-u operation. This circuit, trainlined between units, consists of the main generator battery field of each unit connected in series to the low voltage supply of the lead unit.

This arrangement was ideal when dynamic braking was first applied to diesel-electric locomotives, but changing locomotive requirements and improved techniques have changed this. A new and more reliable system eliminates interlocks, power-plant jumpers, and other hardware, while also improving performance.

Today, there is no need for the field loop circuit; it is actually a design and operating handicap. It has already been eliminated by one railroad; another is moving toward the same goal.

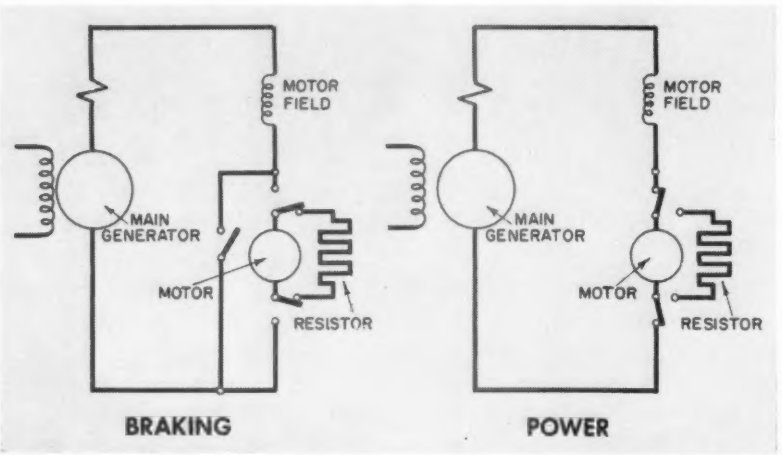
The field loop can be eliminated and the performance can be improved. To utilize motive power effectively, railroads need to operate units in multiple. These can be units turned out by different manufacturers, or different models from the same builder. Except for dynamic brake operation, compatibility is easily and economically achieved. The field loop circuit, peculiar to EMD locomotives, presents the only major difficulty.

Dynamic braking, the use of electric traction equipment to exert a retarding force, is an elaboration of the elementary arrangement consisting of one generator and one motor. There is no provision for regulating dynamic braking or power. For braking, the motor armatures must be connected to a load and the motor fields to a source of current for excitation. Excitation is provided by the main generator. The method of exciting the main generator in power operation affects dynamic brake excitation control.

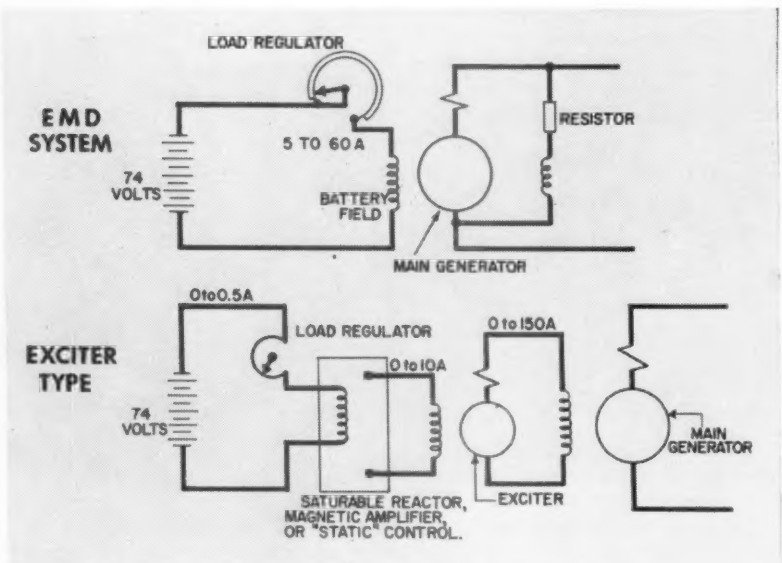
There are two general types of locomotive excitation systems. In the EMD system, the generator is both self and separately excited. Practically all other locomotive generators have only separate excitation. Because less power is required for the separately excited (battery) fields in the EMD system, it is practicable to use a rheostat for control while they are connected to the 74-volt auxiliary power system. When the main generator is only separately excitated, excitation current can come from the machine's own exciter. Generator output is then regulated by controlling the exciter field. It is common practice to use saturable reactors in this exciter field circuit, reducing the signal to extend control of the main generator output.

The EMD main generator excitation system had been used successfully

Article prepared by Electro-Motive Division, General Motors Corp.



Basic electric transmission on diesel locomotives can be adapted for dynamic braking.



Dynamic braking arrangement on EMD locomotives has differed from that used by other builders.

for a considerable time before dynamic braking became well accepted and widely used. For suitable dynamic brake control using the main generator to excite the motor fields, only the main generator's battery field is needed and a 15-amp current is sufficient. Each generator should have the same excitation. Four-unit consists were considered the largest practical locomotives when dynamic braking was first adopted. All these factors led to adoption of a field loop circuit which would connect the battery fields in series for dynamic brake excitation control. The result was that only the EMD design required a special circuit to handle the current and also a control rheostat of rather large capacity.

For systems utilizing exciters, control systems can be so small that there is no problem of supplying several circuits in parallel from a potentiometer in the engineman's control stand. This arrangement is known as the variable voltage system. Current capacity of the basic trainline wiring is also very adequate.

For a non-EMD unit to control an EMD unit in dynamic braking, the potentiometer capacity must be increased so that it can handle the 15 amp required by the EMD units, and the unit must also carry all the hardware associated with the field loop circuit. All EMD units can be modified so that non-EMD units will operate normally when trailing by making only minor circuit changes on the EMD units.

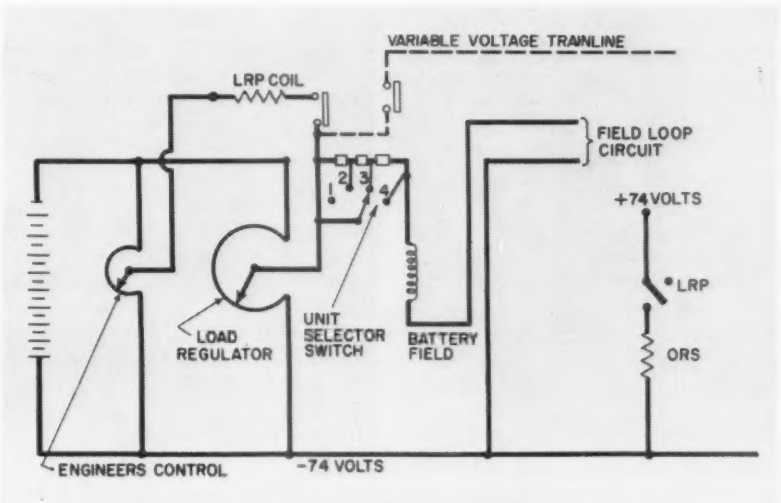
About a decade ago, EMD began to utilize the load regulator on some models for excitation control during dynamic braking as well as during power operation. When the new square controller came into use, the lead unit load regulator was utilized for control of the field loop circuit. A very small potentiometer in the control stand sets up a reference which the load regulator matches through the operation of a sensitive relay, designated LRP on late model wiring diagrams, and a load-regulator control valve ORS. This system can be arranged to energize a variable voltage trainline (broken lines on the diagram). The circuit is capable of supplying more power than the trainline can handle, but is inoperative if the engine is shut down. All units equipped with the square controller have the components necessary for this arrangement. These can be rearranged so that the field loop circuit is not required for dynamic brake operation.

While nothing needs to be added to convert an EMD unit equipped with the square controller from field loop to variable-voltage control, it is logical to ask about the older A units equipped with the original controller, and B units which have no controller. Such units from the F3, introduced in 1947, to the latest models are equipped with the load regulator control valve. For A units, the small LRP relay and circuitry would be required. For B units, the LRP relay and battery field current limiting resistors would be required.

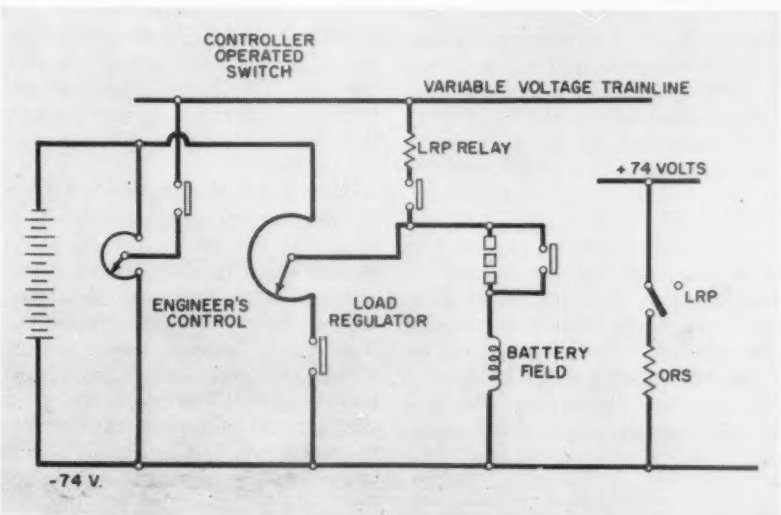
Elimination of the field loop has several advantages. Reliability of performance is increased, because there are fewer contacts in the excitation circuit. With the field loop system, the maximum value of the motor field excitation is limited by the excitation of the generator, not by the capacity of the motor fields.

The variable voltage system permits greater peak braking at lower locomotive speeds. With the field loop, low-speed braking is seriously affected when more than four units are used in a consist. This is not true when the variable voltage system is used. Maintenance will be reduced by elimination of the field loop cable between units. Operation will be simplified because there is no unit selector switch.

Conversion to variable voltage control is easily done for one unit or an entire fleet. Fail-safe features of full brake, partial brake, or no brake can be arranged.



Use of load regulator control for EMD dynamic braking simplifies elimination of field loop.



Conversion of older A units and all B units does require additional control components.

Out of Sight, Out of Mind

By Gordon Taylor

On a recent trip an expensive train delay and diesel engine failure came to my attention. It could have been avoided had the maintenance people done something about an engineman's report of low lube oil pressure. Later on the same trip, a friend on another road told me of his problem—worn out and neglected storage batteries. I dare say one would find that insufficient preventive maintenance is spoiling locomotive performance and increasing costs for many roads. What's happened to preventive maintenance? Has it gone out of style?

The battery trouble mentioned above reminds me of a similar case on another line. Both situations involved locomotives which are maintained at central maintenance shops. From these system shops, the units are sent out for service on branch lines where there very limited maintenance facilities and few maintainers. Locomotives are to perform tours of duty with very little maintenance, finally being worked back to system diesel shops where they can be carefully and completely inspected, cleaned, serviced and repaired.

There should be no reason why locomotives cannot be operated under such a plan, *if they receive proper attention when they reach the maintenance shop*. In both cases the system repair shops was sending out units that had not received adequate preventive maintenance.

Let's consider for a moment storage battery maintenance. While a battery is by no means the most expensive component of a diesel locomotive, it is certainly one of the most important. It costs about $1 per day just to own a 32-cell storage battery, plus the cost of a reasonable amount of care. A storage battery is such a simple thing that most people think it should take care of itself. Being housed out of sight, it is usually out of mind until it fails to start the engine. While a battery actually requires little care, proper maintenance is essential. The storage battery should receive the same careful attention given to all other valuable electrical equipment. Long, dependable battery performance will be obtained by careful observance of a few simple rules:

- Be sure the battery compartment is well ventilated. A free flow of outside air over and around the battery helps to dissipate heat, preventing excessively high operating temperatures. A well-ventilated compartment promotes long battery life. Screens over the ventilator openings should be kept clean and should not be allowed to fill with paint or dirt.
- See that all circuit and bolted connections are clean and tight and are maintained in that condition.
- Block the battery trays into place securely, but do not wedge.
- Maintain proper battery charge by adjusting the voltage regulator to conform with the working schedule of the locomotive and the needs of the battery.
- Keep the battery, its connections, and surrounding parts clean and dry. Vent plugs must be securely locked in place, except when taking specific gravity readings. All vent plugs are provided with small openings for the escape of gases which form during charging. Clogged openings may cause sufficient gas pressure within the cell to break the seal betwen the jar and cover. If, during inspection, these openings are found clogged with dirt, they should be immersed in water and thoroughly cleaned. It may even be necessary to use a piece of wire to clear the openings.
- Keep a record of battery condition and the charging equipment at each inspection. The health of a lead-acid storage battery is most accurately determined with a hydrometer, checking the specific gravity of the electrolyte. This gravity reading varies directly with charge, accurately reflecting battery condition. The hydrometer is as useful to the battery maintainer as a thermometer is to a doctor.

For many, these simple instructions are "old stuff"—so basic that they deserve no further consideration. That's probably the trouble. Maintainers feel that such simple practices are not worthwhile. The result is insufficient preventive maintenance, then time-consuming delays, and, finally, higher repair costs.

Let's see what happened to batteries on locomotives of two railroads which have come to my attention recently.

Case 1. A locomotive was sent out from the system maintenance point for service on a branch line. The local maintainer noticed that the battery seemed to be charging at an excessive rate. He tried to adjust the voltage regulator, but was unable to do so. The next day there was an explosion in the battery compartment which blew off several cell covers and broke a battery tank, causing it to leak. It was necessary to transfer the locomotive 200 miles back to the system maintenance point. There it was found that the explosion had resulted from a combination of defects: an improperly ventilated battery compartment (clogged ventilator screens), high charging rate (liberating hydrogen gas), and loosened battery connectors, which produced the spark that exploded the gas. Proper preventive maintenance would have avoided all this.

Ironically, the unit sent as a replacement also had loose battery connectors. Fortunately, they were found and corrected before they could also cause a failure.

Case 2. On this railroad, a locomotive battery was found to be too weak to crank the diesel. To start the engine without delay, heavy emergency starting cables were connected from the battery on a nearby locomotive to the starting circuit on the crippled unit. While the first unit was being started, one of the battery connectors on the second unit became loosened and the spark produced an explosion which blew off several cell covers and sprayed acid on the maintainer. Here was just another case in which an improperly ventilated battery compartment and a loose con-

(Continued on page 44)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

(Continued from page 42)
nector got together for a big blowout. A weak battery on one unit was the indirect cause of a repair job on another.

Case 3. We'll now consider a different type of battery trouble that occurred on the latter road. A cold spell brought temperatures to zero. Mechanical department headquarters contacted maintenance points, warning that steps should be taken to prevent frozen air lines and to check locomotives so there would be no frozen radiators, frozen engines, or frozen batteries.

"Who ever heard of a battery freezing?" a general foreman asked upon receiving the warning about batteries.

"I never heard of a fully charged battery freezing, because a battery with electrolyte of 1.250 specific gravity has a freezing temperature of 62 deg F below zero," his supervisor replied. "But I know that discharged batteries can be damaged by freezing. A battery with 1.150 gravity will freeze at 5 deg F above zero, and a battery with 1.100 gravity will freeze at 19 deg F above zero. Check batteries on all units that have been standing outdoors for the past two days and phone me."

It was a rather embarrassed general foreman who called two hours later to say he had found two sets of frozen batteries with several cracked and leaky battery tanks.

Many locomotive maintenance people give little thought to their storage batteries. In this case, a foreman learned the hard way that batteries should never be left standing in a completely discharged condition at any time, but especially during cold weather.

Batteries also need protection against high temperatures. Normally, electrolyte temperature may run up to 15 deg F higher than that of the battery compartment. The limit is usually considered to be from 110 to 115 deg F. Even this would be harmful if it continued. Such high temperatures can be produced when charging at too high a rate, a result of having the voltage regulator set too high. High temperatures may result from improper ventilation of battery compartment. Do not use an open flame for inspection of batteries and do not place on the battery any metal object that might create a spark. A gas-filled battery compartment is as quick acting as a firecracker with a very short fuse. High temperatures distort and buckle the lead plates and soften and distort the cell jars and covers.

A clean, dry battery is usually an indication of good maintenance. Like everything else about the locomotive electrical system, it is important that the storage battery, its connections, and surroundings be kept clean and dry. If dirt or acid-soaked mud accumulates on the battery, it will eventually cause trouble. Spilled electrolyte never dries or evaporates. It destroys the wood floor or lining of the battery compartment and corrodes metals subject to attack by sulphuric acid. Current leakage paths to "ground" can be established. These are bad for any control system.

During regular inspections, dry, but dusty, batteries should be rinsed with water at moderate pressure. In freezing weather, if there is not sufficient time for drying in the shop, low-pressure air should be used to blow off surplus water. Do not use steam or high pressure air for cleaning and drying; they remove protective grease from grease seal nuts on the posts. Increase water pressure to wash out battery compartment and to move dirt from under battery trays. This will help prevent "grounds."

Keep the battery clean; keep connections tight and clean. Electrolyte level must be properly maintained by adding water from an *approved* source. See that the battery compartment is well ventilated and that the voltage regulator is adjusted to maintain the proper charging rate. Do this and the battery will reward you with added years of dependable service life. Preventive maintenance really pays its way and may mean that someone isn't caught far from home with his battery down.

If preventive maintenance is worth while for batteries, then think of the savings that can be made on components, such as engines, generators, and traction motors, that are a great deal more expensive. On this subject Doc Watts has a maxim that I think is worth repeating: "He who starts cutting corners on diesel maintenance may soon find himself running in circles, trying to overtake dependable performance while being pursued by a pack of failures."

Simplified Contactor Removal

Illinois Central uses special A-frame for removal and replacement of switching reversers and power contactors. Points which make heavy repairs to switchers have these devices. The 2-in. horizontal pipe which forms a tramrail for the chain hoist has a bracket and set screw, 12-in. from the end, which is used for clamping the device to the electrical cabinet frame. This 56-in. pipe is supported at its outer end by two 48-in. legs. The device is put together with bolts so it can be disassembled readily. Heavy electrical components formerly were removed by hand or with improvised hoists. The new arrangement speeds these operations.

Device is clamped to electrical cabinet frame.

A-frame can be moved into cab disassembled.

(Continued from page 8)

from contact pressures decrease directly with decreases in wheel load, but more than in direct proportion with an increase in wheel diameter. An increase in wheel diameter is more effective than a decrease in wheel load in limiting the contact stresses.

Wheel-load limits, as related to wheel diameter, have been given intensive study by the American Railway Engineering Association's Rail Committee, by the AAR Joint Committee on Relation between Track and Equipment, and by the AAR Research Center staff for the past 20 years. A recommendation covering the relationship between wheel load and wheel diameter was made to the AAR Mechanical Division in 1959 (RL&C, July 1959, p 23). Limits were:

Wheel diam., in.	Load per in. of diam.	Wheel load, lb
33	800	26,400
36	810	29,200
38	820	31,200
40	825	33,000
42	830	34,900

The Mechanical Division subsequently included in Interchange Rule 3: "Cars of over 70-ton normal capacity up to and including 100-ton nominal capacity built new on and after January 1, 1961, shall be equipped with steel wheels of at least 36 in. nominal diameter when four-wheel trucks are used."

Today, some railways are using and accepting in interchange wheel loads 10% in excess of the AAR established load limits. This means that cars having 6½-in. by 12-in. journal bearings and 36-in. diameter wheels are being operated over rail with 276,100 lb—about 34,500 lb per wheel, or 960 lb per in. of wheel diameter.

"As one who has striven for 23 years to improve rail design and metallurgy, to reduce rail failures, and to prolong the life of rail," Mr. Magee commented, "I am seriously concerned about the effects that such heavy wheel loads will have upon rail damage, rail failures, and rail life. The total investment in rail for Class 1 railways in the United States is about $2 billion. At present-day prices, it would cost on the order of $7.5 billion to replace all rail in main-line track.

"Certainly, I have no wish to oppose any progress that is for the overall good of the railway industry. I realize that there are many considerations to be taken into account. These include the cost of car construction and repair, per diem, mileage allowances on non-railway-owned cars, costs of road haul, track and structure maintenance, cost of switching and accounting, and effect on attracting additional traffic."

Based on 1957 figures, Mr. Magee estimates average carload expense and revenue figures to be:

Revenue	$260.80
Switching and accounting	$30.10
Car repairs	16.03
Transportation	36.40
Maintenance of way	13.95
Fixed operating expenses	85.02
Taxes	25.60
Total expenses per carload	207.10
Net operating income	53.70

Mr. Magee then speculates on the extent to which operating expenses could be reduced by increasing car capacity, making it possible to reduce rates with the hope of attracting additional traffic.

While certain operating expenses, such as switching costs and accounting, vary directly with the number of cars or shipments handled, others, such as car repairs, would be increased with an increase in car capacity but not in a direct ratio. Road-haul costs would be increased almost in proportion to the increase in car capacity and weight. Maintenance-of-way expenses, at least for some items, would be increased more than the percentage increase in car capacity and weight. Other operating expenses are fixed, or not actually influenced by the amount of traffic or number of cars.

"If we were to double the car capacity and handle the same traffic with one-half the number of carloadings," Mr. Magee states, "we would save one-half the switching and accounting costs. Assuming that savings in car repairs would be offset by added costs for maintenance of track and structures, the reduction in operating costs would be $30.10, or approximately 6% of the $521.60 revenue for a car with twice the capacity. Net operating income would be increased by 27%. A reduction in rates of only 6% would eliminate this increase in net operating income unless additional traffic were attracted.

"If principal savings in operating expenses with heavier cars are in switching and accounting costs, could this saving not be effected as well by offering the same 'load incentive' rates for two 50-ton cars operated as a unit in lieu of one 100-ton car? Maintenance, interest, depreciation, and terminal inspection costs would be somewhat greater for two 50-ton cars than for one 100-ton car. However, we would not be overloading the journal bearings, axles, wheels, rail, ties, roadbed, and bridge structures. And we have 50- and 70-ton cars available so that such a service could be offered now on an extensive basis. The construction of new 90- or 100-ton cars could only be on the basis of a relatively few per year, so that only a limited service could be offered with them for several years.

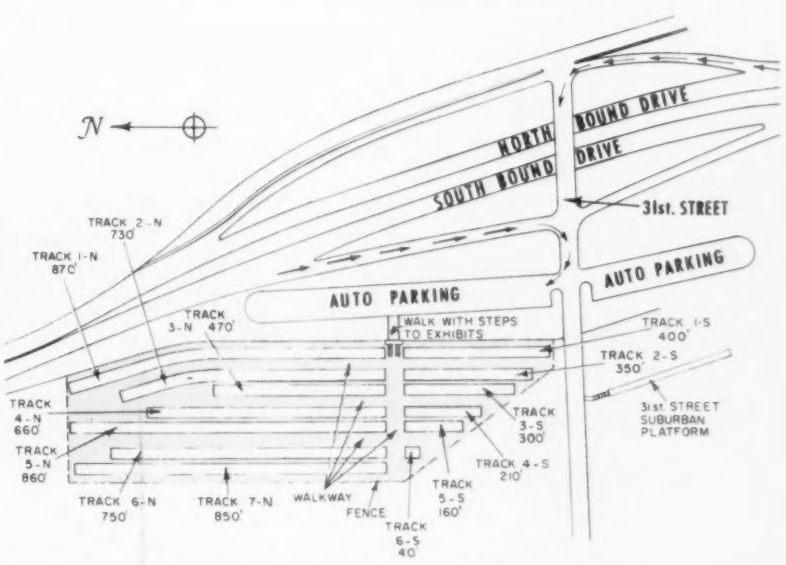
Freight-Car Roller Bearing Installations Near 100,000

Roller bearing installations on U.S. and Canadian main-line freight cars in 1960 totaled 24,801, according to data furnished by Hyatt Bearing Div., General Motors Corp.; SKF Industries, Inc., and The Timken Roller Bearing Co. This is almost double the number of car sets (12,453) applied in 1957, which was the previous high for freight-car installations. From 1939, when the first roller-bearings were applied on 9 box cars, through 1960, 97,724 installations had been made. On January 1, 1961, total freight-car ownership on U.S. Class I roads was 1,661,577, and on Canadian roads, 182,569.

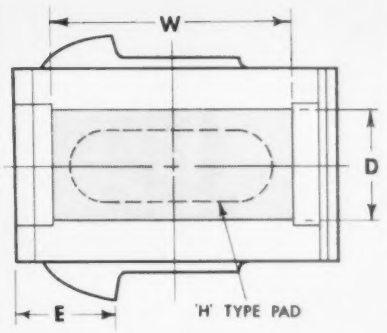
AAR Revises Solid Bearing

Difficulties experienced with applications of H type standard solid journal bearings under old wedges have led to the approval of an I-type which will supersede the H. The raised pad on the H bearing, introduced last year (RL&C, April 1960, p 5), does not always function properly when the wedge has ridges or a very rough bottom surface. Many cases were found where there was little or no free lateral movement between the tops of H bearings and the bottoms of bad wedges. This resulted in undue wear at the ends of the bearing. Most overheating was at the outboard end.

The General Committee of the AAR Mechanical Division has approved the new design with a decrease of ⅛ in. in length on the lug end as compared with the H type (Dimension E). Area of the raised loading pad on the I bearing is increased by making the pad width the same as that of the flat top surface of the bearing. Top surface width (D dimension on the AAR Manual plate D-24) will be decreased ⅛ in., making



Track space at Chicago for Allied Railway Supply Association exhibits during Coordinated Associations' meetings, September 10-13. Indoor exhibits will be at Hotel Sherman.



Shaded area indicates surface of I bearing which now transmits load from bearing to wedge. Dotted line surrounds area of loading pad for H bearing. Lug location has also been changed.

it the same as that on the G-type bearing, which was replaced with the H.

The words "flat and" are being eliminated in the note reading: "Wedge seat pad to be flat and parallel with lining bore to 0.015 in. max." A new note is added: "Wedge seat pad area shall be flat within 0.025 in. in accordance with Section 8(b) in Specification M-501." Specification M-501 has called for 0.015 in. flatness. This tolerance is being increased to 0.025 in. because of the increased size of the raised pad.

Manufacturers have started to convert their plants for production of the new bearing. A joint subcommittee, consisting of representatives of the Arbitration, Car Construction, and Lubrication Committees, has been named to make a study of journal bearing wedges and determine what action is to be taken. The Committee will review practices and make recommendations for improvements in the wedge and journal box assembly which can be accomplished without financial burden on the car owners.

Another special study is being made of the center-to-center dimensions of side frames in trucks. It will be determined if wear or other conditions alter this relationship so that the excessive end wear found on some of the H bearings results.

Letters to the Editor

Copper Penetration

TO THE EDITOR:

The paper—"New York Central Research Shows Turning Removes Copper Penetration" (RL&C, February 1961, p 34)—by T. R. Fredriks, manager-applied research, New York Central, is a valuable and timely contribution to the knowledge concerning axle performance under the conditions of journal overheating. This excellent paper concludes that axles can be properly reconditioned, and safely used, by turning down overheated journals by 0.0625 in. with the work verified by Magnaglo. This procedure would be in lieu of arbitrary scrapping as has been suggested by some railroad mechanical departments.

Although directed at axle reconditioning,

it confirms the existence of copper penetration—"Copper penetration is the result of conditions that cause copper from bronzed-backed journal bearings to be absorbed intergranularly by the hot steel journal; it is not the migration of molten bearing metal into thermal checks or cracks in the journal."

This is the first supporting data on the causes of failure of axles originally reported in Railway Locomotives and Cars, April 1953, in an article entitled, "What Causes Car Journals to Burn Off."

When copper penetration has progressed to the point that a burned-off journal results and derailment has occurred, it is too late to "turn to remove copper penetration." It is hoped that this excellent investigation will give railroad support to the further development and use of Iron Back journal bearings which contain no copper, eliminating the danger of copper penetration.

J. J. Laudig

Personal Mention

Baltimore & Ohio.—*Baltimore, Md.:* F. B. RYKOSKEY, general superintendent motive power and equipment, appointed chief mechanical officer. R. W. SENIFF, manager research, appointed manager tests and engineering. *Cincinnati, Ohio:* W. F. DADD appointed superintendent motive power, Western region.

Canadian National.—*Moncton, N.B.:* S. A. LEWIS, supervisor of motive power control, appointed assistant general superintendent of transportation, Atlantic region.

Chesapeake & Ohio.—*Richmond, Va.:* A. O. BALLINGER appointed assistant electrical engineer—fixed property, succeeding H. A. WITTEN, deceased. *Ashland, Ky.:* C. O. HUGHES, JR., appointed car lubrication inspector.

Denver & Rio Grande Western.—*Denver, Colo.:* P. W. STAUTER, assistant to supervisor of refrigeration, appointed chief mechanical inspector.

Elgin, Joliet & Eastern.—*Joliet, Ill.:* ROBERT E. BRAY, foreman, steel car shop, appointed chief car inspector, succeeding GEORGE A. HORKEY, retired.

Erie-Lackawanna. — *Salamanca, N.Y.:* WILLIAM K. PARKER appointed road foreman of engines, Allegany-Bradford divisions, succeeding ARTHUR G. CLEMENCE, retired. *Meadville, Pa.:* ROBERT C. ROSE appointed road foreman of engines, Meadville and B&SW divisions.

ICC, Bureau of Safety & Service.—*Albuquerque, N.M.:* CHARLES H. GROSSMAN, zone supervisor, retired. Mr. Grossman, under a Presidential recess appointment, was director of locomotive inspection at Washington, D.C., from September 1953 until July 1954.

Louisville & Nashville.—*South Louisville, Ky.:* HENRY U. MULLINIX appointed master me-

chanic, succeeding J. A. PARRISH, retired. Mr. Mullinix formerly general foreman, diesel locomotive shop.

New York Central.—*New York:* ANDREW J. RITTER appointed supervisor steam generator maintenance.

Northern Alberta.—*Edmonton, Alta.:* R. D. C. COMRIE appointed master mechanic, succeeding A. WOTHERSPOON, deceased. Position of road foreman of engines abolished.

Richmond, Fredericksburg & Potomac.—*Richmond, Va.:* JAMES A. W. SMITH, general foreman locomotive department, Acca Locomotive Terminal, appointed supervisor diesel equipment. RALPH G. SELFE, assistant general foreman locomotive department, appointed general foreman diesel maintenance. RUSSELL D. STONE, foreman freight car maintenance, appointed chief car inspector.

Soo Line.—*Minneapolis, Minn.:* THOMAS F. KEARNEY appointed chief mechanical officer. Mr. Kearney formerly general mechanical superintendent of the DSS&A.

Western Maryland.—*Hagerstown, Md.:* R. R. HOLMES appointed engineer of tests. Former position of chief chemist abolished.

Supply Trade Notes

ELLCON-NATIONAL, INC. — *Emil P. Kondra,* vice-president in charge of sales, appointed also assistant to the president. *Edwin T. Richards,* Richards Railway Equipment Co., Tulsa, Okla, appointed Southwestern representative.

■

KOPPERS CO—*Fletcher L. Byrom* elected president, succeeding *Fred C. Foy* who continues as chief executive officer.

■

PULLMAN-STANDARD.—*J. W. Bergen* appointed assistant vice-president in sales department. Mr. Bergen formerly manager of western railway sales, Symington Div., Symington-Wayne Corp.

■

BUCKEYE STEEL CASTINGS CO.—*L. E. Clark* appointed sales representative, Western district. Headquarters, 80 E. Jackson Blvd., Chicago.

■

WAUGH EQUIPMENT CO.; HYDRA-CUSHION, INC.—New York office now at 230 Park ave., New York.

■

YOUNGSTOWN STEEL CAR CORP.—*James L. Kelly* named vice-president and general manager.

■

SPRAY PRODUCTS CORP.—*J. Paul Saunders Co.,* Bowling Green, Ky., appointed representative in Kentucky, Tennessee, Mississippi, and Alabama.

■

CRUCIBLE STEEL CO. of AMERICA.—*Josef H. Buerger, Jr.,* appointed director of sales. *Robert M. Simpson,* assistant general

manager—field sales, appointed assistant director of sales.

■

UNITED SHOE MACHINERY CORP.—District representatives, Pop Rivet Division: *Carlyle Abbott*, Detroit; *Thomas R. Freeman*, Kansas City, Mo., and *Ned B. Turner*, Dallas, Tex.

■

AIR REDUCTION SALES CO.—*N. F. Moody* named regional sales manager, eastern region. *F. N. Zabriskie* appointed assistant manager—sales, midwestern region. *J. P. Casalis, Jr.*, appointed district manager, St. Louis district.

■

FAIRBANKS, MORSE & CO.—FM has signed a 20-year marketing agreement with *W. H. Dorman & Co., Ltd.*, Stafford, England, to introduce Dorman L and Q high-speed diesel engines in the United States.

■

LEONARD J. SIMONS CO.—Headquarters moved from Melrose Park, Ill., to 8501 S. Kedzie ave., Chicago 52.

■

SCREW & BOLT CORP. OF AMERICA.—*Louis Berkman*, chairman of the board, elected also president, succeeding *Donn D. Greenshields*, retired.

■

WESTINGHOUSE AIR BRAKE CO., AIR BRAKE DIV.—*D. F. McConnell* appointed district engineer, with headquarters in Chicago, succeeding *D. G. Blaine*, who has been transferred to Wilmerding, Pa., as manager of new Value Analysis Unit.

John E. Angst
General American

Harry H. Chapman
Owens-Corning

GENERAL AMERICAN TRANSPORTATION CORP.—*John E. Angst* appointed general manager, freight-car division. Mr. Angst previously vice-president of ACF Industries' car division in New York.

■

DUFF-NORTON CO.—*C. Richard Schmitt* appointed sales representative in New York State, with headquarters in Syracuse, N.Y.

■

OWENS-CORNING FIBERGLAS CORP.—*Harry H. Chapman* appointed manager of transportation sales. Mr. Chapman previously supervisor of electrical insulation apparatus sales.

■

WESTINGHOUSE ELECTRIC CORP.—*George L. Wilcox*, president of Canadian Westinghouse Co., Hamilton, Ont., elected vice-president and assistant to the president at Pittsburgh, Pa.

SERVO CORP. OF AMERICA.—Agreement signed with *Wheel Checkers*, Denver, Colo., gives Servo exclusive marking rights on Wheel Checker device which automatically detects broken wheel flanges and loose wheels on passing trains.

■

WIX CORP.—*Ford-Lynch Associates* appointed sales representative, southeastern railroads.

■

BUFFALO BRAKE BEAM CO.; UNIT TRUCK CORP.—*Stephen G. Peterson* elected vice-president, succeeding *Charles R. Busch*, retired.

■

ACF INDUSTRIES, INC.—*Francis H. Boland, Jr.*, elected a vice president of ACF and appointed general manager, American Car & Foundry Division. *Charles F. Venrich*, who formerly headed division's railway sales at Chicago, appointed director of marketing for the division at New York.

OBITUARY

JOHN E. DIXON, 83, retired president of Baldwin-Lima-Hamilton, Corp., died in Pinehurst, N.C., Feb. 26.

■

ARNOLD G. PETERSON, service engineer, W. H. Miner, Inc., died Feb. 23 in Chicago.

■

JOHN T. CRALLEY, 80, retired vice-president, Standard Railway Equipment Division of Stanray Corp., died Feb. 25 at Santa Barbara, Calif.

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